4

Affected Environment

Chapter 4, *Affected Environment* contains descriptions of the existing conditions and resources within the study areas. This study evaluates improvements to Interstate 81 (I-81) and Norfolk Southern's Shenandoah and Piedmont rail lines in Virginia. Since these two transportation facilities are geographically distant from each other for most of their length, a separate study area was created for both I-81 and the rail lines as described in Chapter 2, *Purpose and Need*.

Existing conditions are described for the natural and human environment that may be affected by, or may affect, the nature of improvements within the study areas. The width of the study area varies depending on the resource being described, but is generally 500 feet on either side of the existing pavement on I-81 or rail centerline. This ±1,000 foot buffer width was used because it was believed to represent the maximum area within which potential highway or rail improvement concepts may be developed. Historic properties, visual resources and economic characteristics are described beyond these limits because potential effects on these resources may occur beyond the physical limits of the improvement concepts.

Additional detailed information is available in three technical reports that are also available upon request: 1) the *I-81 Corridor Improvement Study Economics Technical Report*, 2) the *I-81 Corridor Improvement Study Historic Properties Technical Report*, and 3) the *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report*.

This chapter is organized in such a way that the reader can either read a brief overview of existing conditions, or they may read individual sections that have more specific information for each resource. Section 4.0 below provides a summary of: the existing land uses and the man-made environment; visual and historic resources; the air and noise environment, and the natural environment in the study areas. More information on existing conditions is contained in the following sections, Sections 4.1 through 4.11. All figures referenced in Chapter 4 are located in a separate chapter near the end of the Tier 1 DEIS, Chapter 8, *Figures*.

Summary of Affected Environment

I-81 Study Area

Land Uses and Man-Made Environment

The I-81 study area is largely undeveloped and rural, with dominant land uses being agriculture/pasture and forest. Areas along I-81 classified as prime farmland and agricultural/forestal districts are concentrated in the Shenandoah Valley in Augusta, Rockingham, Shenandoah, and Frederick Counties.

Where it does occur, development is primarily concentrated near the interchanges and near I-81 in the vicinity of cities and towns. For many of the localities, commercial and industrial development is encouraged along I-81 near interchanges through their planning and zoning practices. Based on local comprehensive plans, seven of the counties along I-81 have transportation objectives specific to I-81. Pulaski and Shenandoah Counties support six-laning of I-81, and Roanoke County supports rail freight and passenger service parallel to I-81 with limited widening of I-81. Five counties support either new interchanges or interchange improvements along I-81.

Demographically, the U.S. Census block groups within the I-81 study area have a relatively low percentage of minority and low-income populations, and these are concentrated in more urban areas, such as Roanoke and Harrisonburg. Several community facilities, including schools and fire and rescue units, are near the cities and towns. Two large universities are within the I-81 study area: James Madison University in Harrisonburg and Shenandoah University in Frederick County.

Key factors that influence economic conditions are population and employment characteristics. Since 1970, the population for counties (including cities and towns) along I-81 has grown almost 40 percent. Warren County, Frederick County, and the City of Winchester, in the northern section of the corridor, have experienced growth rates above 100 percent. Between 1990 and 2000, the total labor force for counties along I-81 grew at a similar pace as Virginia as a whole. However, since 2000, the labor force growth rate has slowed substantially in the counties along I-81 when compared to the rest of Virginia. In 2000, the largest employment sectors in the I-81 study area were services, manufacturing, and retail trade. A windshield survey identified 5 industrial parks (or industrial "clusters") and 13 commercial centers near various interchanges along I-81. These industries are extremely dependent on the interstate highway system for the movement of goods.

A total of 18 parks and recreation areas exist or are planned within the I-81 study area. These include the George Washington and Jefferson National Forest, the New River Trail State Park

in Pulaski County, the Appalachian National Scenic Trail which crosses I-81 twice, the Virginia Creeper Trail in Washington County, as well as a variety of city and town parks.

Visual Resources

Driving on I-81 is generally considered to have visual appeal for motorists. Visual resources viewed from the interstate include major river crossings, unique geologic features (*e.g.*, limestone outcrops), and scenic views of valleys, mountains, and forest. A number of visual resources are also subject to views of I-81 such as recreational facilities (trails and parks), rivers, and scenic byways. Most of these resources cross the interstate.

Historic Properties

Historic properties were defined as properties that 1) are listed on the National Register of Historic Places (NRHP), 2) are determined eligible for listing, or 3) may be potentially eligible for listing. Approximately 930 individual architectural resources and 115 archaeological sites are recorded at the Virginia Department of Historic Resources within the I-81 study area. The majority of these, however, have not been evaluated for National Register eligibility. There are 52 structures, 9 historic districts, 10 battlefields, and one archaeological site that are listed on the National Register or determined eligible for listing. Approximately 190 additional architectural resources were identified as potentially eligible for listing on the NRHP.

The northern portion of the study area, in Shenandoah and Frederick Counties, has a heavy concentration of battlefields and is within an area known as the Shenandoah Valley National Battlefield Historic District (SVBNHD). The SVBNHD is classified by the National Park Service as a "national heritage area" and, as a whole, has not been listed or determined eligible for the National Register.

Air and Noise Environment

All counties along I-81 are in attainment for carbon monoxide (CO) and particulate matter. A portion of Smyth County (White Top Mountain) is in nonattainment for ozone. Botetourt, Roanoke, and Frederick Counties, whose emissions are close to or exceed the 8-hour National Ambient Air Quality standard for ozone, have elected to become Early Action Compact Areas. The remaining counties along I-81 are in attainment for the eight-hour ozone standard.

Over 7,200 sensitive noise receptors are near I-81. These include over 7,200 homes, 18 parks, nine schools, one library, and 20 historic properties previously listed or eligible for listing on the National Register.

Natural Environment

Predominant natural resources in the I-81 study area include karst features (*e.g.*, sinkholes, caves, and springs) and streams, both of which provide habitat for a variety of threatened and endangered species. Caves in the study area may support the state and federally

endangered gray bat and/or Indiana bat, while rivers and streams throughout the study area support a variety of threatened and endangered fish and mussel species. In total, approximately 180 perennial streams are in the I-81 study area, and water quality in these streams is generally considered to be good. The highest stream densities are in Roanoke, Smyth, Washington, and Augusta Counties. Fifteen of the streams are also designated trout streams. I-81 also crosses Claytor Lake in Pulaski County. Because much of the corridor has steep terrain and open pasture lands, wetlands in the I-81 study area are sparse and generally restricted to fringe wetlands around farm ponds, emergent wetlands near springs and seeps, and forested wetlands along floodplains.

Rail Study Area

Land Uses and Man-Made Environment

Land use patterns within the 13 rail improvement sections are predominantly undeveloped forest and agricultural land, with occasional residential, commercial and industrial development. Farmland resources are prevalent throughout the Piedmont line rail improvement sections, including prime farmland and various agricultural/forestal districts.

Socioeconomic conditions are only described for rail improvement section 7 at Riverton Junction since improvements at all other rail sections would occur within the existing rail right-of-way and were therefore not likely to effect social or economic conditions within the area adjacent to the improvement. At Riverton Junction, in Warren County, only a small neighborhood with single-family homes is within the rail study area.

One park and one trail are within the rail study area. In Pulaski County, the rail study area intercepts George Washington and Jefferson National Forest. The Appalachian National Scenic Trail is within the rail study area in Fauquier County.

Visual Resources

The inventory of visual resources focused on views of the railroad. Visual resources subject to views of the rail study area include the George Washington and Jefferson National Forest, the Appalachian National Scenic Trail, two Virginia Byways, and two potentially scenic rivers.

Historic Properties

Historic properties within the rail study area are concentrated along the Piedmont rail line in Northern Virginia. Approximately 95 individual architectural resources and 17 archaeological sites are recorded at the Virginia Department of Historic Resources within the rail study area. The majority of these, however, have not been evaluated for eligibility. There are six structures, seven historic districts, six battlefields, and one archaeological site within the rail study area that are listed on the National Register or determined eligible for listing.

Air and Noise Environment

All counties along the rail study area are in attainment for carbon monoxide (CO). Only Prince William County is in non-attainment for particulate matter. A portion of Smyth County (White Top Mountain) is in nonattainment for ozone and Roanoke County has elected to become an Early Action Compact Area. The remaining counties along the rail study area are in attainment for the eight-hour ozone standard.

Over 16,000 sensitive noise receptors are along the Piedmont and Shenandoah rail lines in Virginia. The entire rail lines were considered because an increase in trains as a result of rail improvement would potentially affect noise levels the entire distance. Noise receptors include approximately 16,000 homes, 60 parks and recreation areas, 26 schools, three hospitals, two libraries, and 11 historic properties previously listed or eligible for listing on the National Register.

Natural Environment

Similar to the I-81 study area, karst features are prevalent along the Shenandoah rail line sections. The rail study area also includes numerous streams that both cross and run parallel to the rail. However, because the topography is less steep along the Piedmont rail line, the rail study area includes areas with larger floodplains and forested wetlands in those floodplains. Approximately 180 acres of wetlands are located within the rail study area, and the majority of these have relatively high functional values. There are no previously documented threatened and endangered species within the rail study area. In total, approximately 30 perennial streams are in the rail study area, and water quality in eight of these are considered impaired as a result of fecal coliform.

The following sections of Chapter 4 expand upon the preceding information on the affected environment within the study areas.

4.1 Land Use

This section describes existing and future land use characteristics within the study areas based primarily on available planning documents, aerial photography, and coordination with planning staff within the local jurisdictions. In addition, 2000 satellite imagery was used to develop a general depiction of basic land cover types. Detailed Landsat land cover classifications were consolidated into broader land use categories such as developed, agricultural, and forested lands. Figures 5-6 and 5-7 in Chapter 8, *Figures* depict existing land use categories within a mile of either side of the I-81 and rail centerline, respectively.

4.1.1 I-81 Study Area

Existing land uses and land use patterns planned in the future (including future transportation objectives) were first characterized by reviewing current comprehensive plans for the 13 counties through which I-81 travels. Interviews were then conducted with local planners representing the 13 counties, as well as the seven cities in the I-81 study area: Cities of Bristol, Radford, Roanoke, Salem, Staunton, Harrisonburg, and Winchester.

Existing Land Use Patterns

The dominant land uses within the I-81 study area are agricultural/pasture land and upland forest. A review of the counties' comprehensive plans illustrates that many of the counties seek to preserve their agricultural land and rural character (including Washington, Smyth, Roanoke, Augusta, Frederick, Rockingham, and Shenandoah Counties) while concentrating development along the interstate. Developed land uses are predominant within the many towns and cities along I-81. Existing development is also concentrated closer to I-81, particularly near interchanges along the interstate. Developed areas include commercial, industrial, and residential land uses.

Transportation Objectives

Several counties have transportation elements within their comprehensive plans that relate specifically to I-81. These are summarized in Table 4.1-1 below.

Table 4.1-1 Transportation Objectives Specific to I-81 By County

County	Transportation Objectives
Washington	Construct Exit 11 on I-81 to handle industrial park traffic
Wythe	Upgrade Exit 80 on I-81 to improve traffic flow; convert Exit 67 on I-81 to a full-scale exit
Pulaski	Support six-laning I-81
Roanoke	Support rail freight and passenger service parallel to I-81; limit widening of I-81
Botetourt	Redesign Exit 150 on I-81 to improve traffic flow to other routes; support widening I-81 and improve the county's five exits along I-81
Shenandoah	Support six-laning I-81 (specifically incorporate truck climbing lanes between Exit 298 and the I-66 exit); construct new exit on I-81 on the north side of the Town of Woodstock; reduce congestion and increase capacity at I-81 exits
Frederick	Construct new exit on I-81 at Papermill Road between Exits 310 and 313

Sources: Comprehensive Plans (various dates) for each county and interviews with county planners, 2004

Planned Growth Areas

As mentioned above, development is concentrated in cities and towns and near the interchanges along I-81. Such commercial, industrial, and residential development is considered planned growth due to the presence of existing public infrastructure (water, sewer, roads, and access to I-81). Based on comprehensive plans and interviews with local planners, areas along I-81 were identified where planned growth is encouraged. Section 4.3 provides a more detailed description of specific proposed development projects along I-81.

Because I-81 is an important transportation facility for providing access to goods and services, planned growth along I-81 has been incorporated into many of the counties' comprehensive plans as described below. Several I-81 interchanges are included because of their intense development and importance to local economies; and because they may be affected by implementation of transportation improvements.

In Washington, Smyth, Wythe, and Pulaski Counties, residential, commercial, and industrial growth is planned along I-81. Washington County specifically seeks to support commercial growth along I-81 (Washington County, 2002). Additionally, Pulaski County encourages commercial development associated with I-81 in the Draper area, and Rockbridge County encourages shopping centers, and industrial employment centers at I-81 interchanges (Pulaski County, 2000; Rockbridge County, 2003). Exits 73 and 80 near Wytheville are particularly developed with commercial facilities and, according to local planning officials, are attractive locations for future development.

Planned growth in Montgomery County is encouraged adjacent to the Towns of Blacksburg and Christiansburg, and along I-81 near the City of Radford. Exit 118 in Christiansburg is a developed interchange that includes hotels, restaurants, gas stations, and other commercial

conveniences. This interchange also provides access to Virginia Tech, the largest university in Virginia. In Roanoke County, planned growth areas include I-81 and I-581.

Planned growth areas in Botetourt County include four industrial and business parks near Exit 150, which is also near U.S. Routes 11, Alternate 220, and 460. Additionally, Botetourt County encourages commercial development at Exits 156, 162, and 168 on I-81. Exit 150 is Botetourt County's prime economic tool and contributes approximately $700,000 annually in tax revenues.

Rockbridge, Augusta, and Rockingham Counties also emphasize planned development along I-81. Rockbridge County promotes regional and large-scale uses, while Augusta County seeks to protect the function and value of the I-81 interchanges. In Rockingham County, planned development consists of intensifying employment centers along I-81 south of the City of Harrisonburg.

Exits 243 and 245 in Harrisonburg are heavily developed with a variety of commercial and industrial establishments, as well as James Madison University. Some of the university's residence halls and academic buildings are adjacent to the I-81 study area at Exit 245.

In Frederick County, land is being rezoned at Exit 317 for residential development. Exit 313 in Winchester includes large commercial establishments such as Apple Blossom Mall and Wal-Mart. According to local planning officials, there is little available land for expansion in this area and transportation improvements could have an effect on this important economic resource.

4.1.2 Rail Study Area

Land use patterns in the rail study area are predominantly undeveloped forestland and agricultural land with occasional residential and commercial/industrial areas. The largest concentration of residential development is found along the rail improvement section in Pittsylvania County north of Danville, in northern Clarke County around the Town of Berryville, and at the Warren/Fauquier County line in Northern Virginia. Smaller residential areas are found in the rail improvement sections in Warren County (including the area near the Town of Front Royal) and along the rail improvement section in Washington County where the rail line is close to I-81. The largest concentration of commercial or industrial development is found in Clarke County near the Town of Berryville. Smaller areas with commercial or industrial development include the section in Prince William County where it parallels the Route 234 Bypass, northern Warren County, and Pittsylvania County.

4.2 Human Environment

This section discusses the human environment in the study area including environmental justice communities and community facilities. Information on these community characteristics was compiled from aerial photography, readily available GIS data, and other secondary sources (U.S. Census, DemographicsNow, and the Virginia Employment Commission). Community facilities, like most resources, were identified within a corridor that extends 500 feet on either side of I-81 and the rail lines. Demographic information on minority and low-income populations, however, was characterized beyond the 1,000-foot corridor as described below.

4.2.1 I-81 Study Area

Environmental Justice

To identify communities along I-81 with high concentrations of minority and economically disadvantaged persons, demographic information on minority and low-income populations was characterized at the census block group level. Delineated by the United States Census Bureau, a block group is the smallest geographic unit for which demographic data are readily available. Census block groups represent discrete populations and generally contain between 600 and 3,000 people. For the purposes of this Tier 1 study, it is assumed that data reported for census block groups along I-81 generally reflect the population characteristics within the area 500 feet on either side of I-81. For comparison purposes, data were also characterized at the county-wide level (counties and cities along I-81) and the statewide level. If a "Build" concept (or portion of a "Build" concept) are advanced into Tier 2, a more detailed inventory of minority and low-income populations in the study area would be performed.

The following section discusses minority and low-income populations within the I-81 study area (as represented by census block groups that intersect I-81).

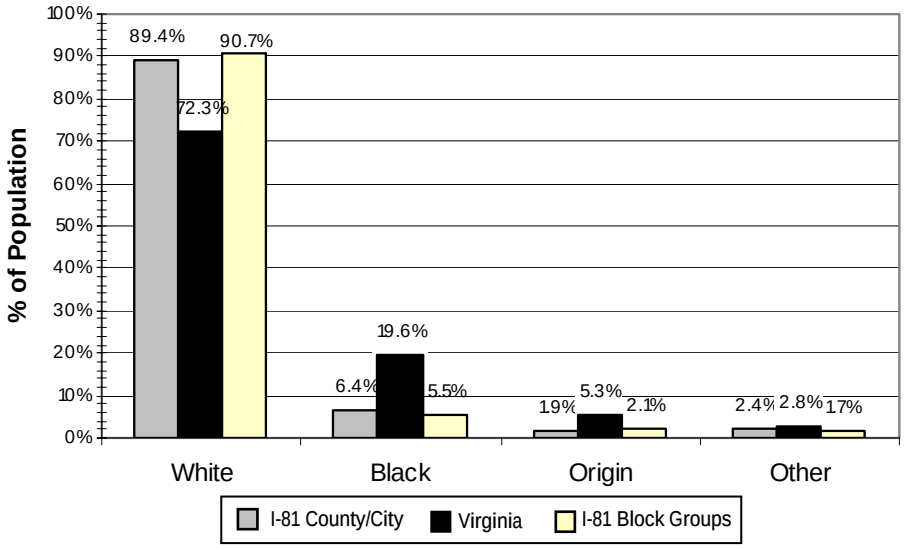
Minority Populations

In 2003, 89 percent of the population in the counties and cities along I-81 was white, 6 percent was black, 2 percent was Hispanic, and 2 percent was all other racial groups (Figure 4.2-1)[1]. As compared to Virginia as a whole, the populations at the county and city level are less racially diverse. In 2003, non-white racial groups represented 28 percent of the state's 7.4 million population, whereas only 11 percent of the population within the counties

1 As defined by *DemographicsNow*, "Hispanic" includes persons of Hispanic or mixed-Hispanic backgrounds and "all other" includes all other races that are not all or partially Hispanic.

and cities along I-81 was classified as non-white. Given that 11 percent of the counties and cities are minorities, block groups that were comprised of over 15 percent minorities were considered to have high concentrations of minority persons for the purpose of this study.

Figure 4.2-1 Racial Composition of Population (2003): I-81 Study Area



Source: DemographicsNow and RKG Associates, Inc., 2004

In total, there are 31 block groups within 500 feet of either side of I-81 that had at least 15 percent of the population being minority (see Figure 4-1 in Chapter 8, *Figures*)[2]. For purposes of this Tier 1 level analysis, these 31 block groups represent areas of minority populations in the study area. There are concentrations of minority populations in the Cities of Roanoke (Milepost 141), Harrisonburg (Mileposts 241 to 249), and Winchester (Mileposts 313 to 317). Around the City of Roanoke, minorities comprise over 90 percent of the population in some block groups.

Low-Income Populations

For purposes of identifying low-income populations in the I-81 study area, the U.S. Department of Health and Human Services (HHS) definition of poverty was used. For 2000, the HHS threshold for "poverty" ranges from an annual household income of $8,794 for a 1-person household to $35,060 for a 9+-person household. The percentage of people in the counties and cities along I-81 classified as living at or below the poverty level in 2000 was estimated at approximately 12 percent. This rate was approximately 3 percent higher than the Commonwealth as a whole.

[2] For this analysis, ≥15 percent was used to represent areas with higher than average concentrations of minority populations.

There are 39 block groups with concentrations of households in poverty greater than 15 percent, which represent areas of low-income populations for the purpose of this study.[3] Figure 4-2 in Chapter 8, *Figures* shows the location of these block groups. The largest concentrations of people in poverty exist in the Cities of Roanoke (Milepost 141) and Harrisonburg (Mileposts 246 to 249). However, it is important to note that a substantial portion of the Harrisonburg population are likely college students. Since most college students do not earn a steady income, they are counted as being in poverty even though they are traditionally supported through financial aid or other revenue sources such as their family. For this reason, it is likely that the concentration of poverty in Harrisonburg is not as great as the Census data indicate.

Community Facilities

There are a variety of community facilities within the I-81 study area, such as schools, fire and rescue facilities, and libraries. The majority of community and social facilities are in the larger cities and towns, such as Winchester, Staunton, Harrisonburg, Roanoke, Christiansburg, Wytheville, and Bristol. There is much higher residential development within these communities as well.

Neighborhoods

There are large, higher-density residential neighborhoods within the I-81 study area. A windshield survey of I-81 identified 36 distinct residential neighborhoods. Almost all these neighborhoods are within the cities and larger towns. The communities of Wytheville, Christiansburg, Roanoke, Harrisonburg, and Winchester account for more than two-thirds of these residential neighborhoods. In most cases, these neighborhoods are comprised of detached, single-family houses. However, there are three large mobile home neighborhoods (Mileposts 70, 118, and 320) and four apartment/townhouse communities (Mileposts 246, 266, 312, and 316).

Schools

Several primary and secondary schools are within I-81 study area. These are Meadowview Elementary School off Exit 24 in Washington County, Chilhowie High School north of I-81 near Milepost 37 in Washington County; Newbern Elementary School at Milepost 100 in Pulaski County; Pleasant Valley Elementary School in the City of Harrisonburg off Exit 243; and Middletown Elementary School and Robert E. Aylor Middle School in Frederick County. In addition, the Smyth Career and Tech Center is in Smyth County at Exit 39. A vocational school, Grafton School, is just north of the Apple Blossom Mall in the southwest quadrant of Exit 313 in Winchester.

[3] For this analysis, ≥15 percent was used to represent areas with higher than average concentrations of low-income populations.

Colleges and Universities

There are two large universities near I-81. James Madison University, in Harrisonburg, spans both sides of I-81 north of Exit 245. The school has athletic facilities, dormitories, and parking lots within the I-81 study area. Shenandoah University is in Frederick County, west of I-81 immediately off Exit 313. The university property abuts the exit ramp for southbound traffic on I-81 connecting to U.S. Route 50 westbound. Most of the land in the I-81 study area at this interchange consists of recreational facilities and open space. The university's football stadium is on the opposite side of I-81, connected to the campus by an access road under I-81.

Libraries

One library is in the I-81 study area: New Market Community Library in southern Shenandoah County.

Fire and Rescue Facilities

Based on available GIS information, there are four fire and rescue facilities within the I-81 study area. At the southern end of the study area is Fire Station 3 at Milepost 7 in the City of Bristol and the Atkins Fire Station at Milepost 52 in Smyth County. Fire Station 3 services the northern portion of Bristol, including areas west of the interstate via Old Airport Road. In the northern section, the Woodstock Volunteer Rescue facility is off Exit 283 and the Stephens City Fire Station, in Frederick County, is west of I-81 near Exit 307. This fire station appears to serve areas on both sides of I-81 by using the bridge over I-81 to access properties east of I-81.

Hospitals and Medical Facilities

There are no hospitals or health facilities within the I-81 study area.

Other Facilities

The runway for the Mountain Empire Airport, in Smyth County, is within the I-81 study area.

4.2.2 Rail Study Area

The human environment was inventoried for the one rail improvement section that may occur outside the existing right-of-way (at Riverton Junction-rail section 7). This is the only rail improvement that may physically affect community facilities or minority and/or low-income populations. If one or more "Build" concepts (or portions of "Build" concepts) are advanced, potential noise impacts to surrounding communities (including to Environmental Justice communities) would be addressed in Tier 2 in the remaining rail sections.

The Riverton Junction rail section lies within two census block groups. Information on community characteristics was analyzed for the two block groups in their entirety.

Environmental Justice

Minority Populations

In 2003, approximately 86 percent of the residents in the Riverton Junction rail section census block groups were white. Black residents constituted the second highest group, at 11 percent. Hispanic and other ethnicities accounted for the remaining 3 percent. Neither of the rail block groups along rail section 7 has concentrations of minority residents greater than 15 percent.

Low-Income Populations

The Riverton Junction rail section had more than 13 percent of its residents below the poverty line in 2000. There are no block groups with more than 15 percent of their respective populations in poverty in the rail study area.

Community Facilities

Neighborhoods

A portion of a small neighborhood consisting of single-family detached houses is within the Riverton Junction rail section. However, none of these houses are within the rail study area.

4.3 Economic Conditions

This section provides a general overview of local and regional economic conditions that would potentially be affected by highway and/or rail improvements. Data were compiled from available secondary sources (U.S. Census and the Virginia Employment Commission) and supplemented with a field survey and information provided by local public officials.

Key factors that influence economic conditions are population and employment characteristics. These serve as baseline inputs into the economic model used for analysis purposes. Since population and employment data are not readily available within the I-81 and rail study areas, data were collected at the U.S. Census block group level, the smallest geographic area for which such data are available. These data should generally reflect the local economic conditions within 500 feet on either side of the interstate and rail. In addition to the block group level data, this section provides population and employment characteristics in the counties and cities along I-81 as compared to the Commonwealth of Virginia in order to characterize larger regional economic trends.

For local economies, a general description is also provided of the major areas of commercial and industrial development within 500 feet of either side of I-81 and the railroad. In addition, planning officials from the counties and several major cities along I-81 responded to questions during interviews conducted in the summer of 2004 regarding economic development plans and proposed development projects at interchanges along I-81 that could influence future traffic demands along and adjacent to the corridor.

More detailed information on local as well as regional economic conditions is provided in the *I-81 Corridor Improvement Study Economics Technical Report*.

4.3.1 I-81 Study Area

Local Economies

Population and Employment

Using the most current data available, the total 2003 population in the census block groups along I-81 was over 235,000 people. This reflects a 43 percent increase since 1970. In comparison, the population in the Commonwealth of Virginia increased more than 60 percent in the same time frame. The total number of workers (aged 16 to 64) available in 2003 was almost 145,000 people. This reflects a 14 percent increase since 1990 versus the 16 percent increase in workforce seen in Virginia as a whole.

Industrial Parks/Commercial Facilities

The primary locations for commercial and industrial activity are at the interchanges along I-81. A total of 75 interchanges have commercial and/or industrial uses within the I-81 study area. Five industrial concentrations are found at Exits 22, 47, 50, 118, and 243. These industrial areas are dependent on the interstate highway system for moving intermediate and finished goods. A large number of commercial facilities are found at the interchanges, including restaurants, hotels, and gas/convenience stores. These businesses tend to serve through traffic because of the convenient on-and-off access of the interchanges. Exits 117 and 118 in Christiansburg and Exits 245 and 247 in Harrisonburg have the most commercial activity in terms of number of businesses.

In addition to the commercial services at interchanges that support transient traffic, there are 13 commercial centers that support local and regional consumers. These centers typically have a substantial collection of retail opportunities and are near Exits 5, 7, 14, 17, 35, 70, 81, 118, 143, 227, 243, 247, 283, and 313. The commercial centers at Exits 7 (Bristol), 118 (Christiansburg), 247 (Harrisonburg), and 313 (Winchester) are regional shopping centers that offer more commercial development than the local population alone could typically support. At Exit 243 in Harrisonburg, there is a large car dealership, known as the Harrisonburg Auto Auction, as well as a Holiday Inn, Red Carpet Inn, and Ramada Inn. East of Exit 283 in Woodstock, there is a collection of auto service businesses, such as Sunoco, Exxon, Shell, and Liberty, as well as fast food restaurants and a Wal-Mart store.

A portion of the commercial and industrial development within the I-81 study area is along U.S. Route 11. U.S. Route 11 runs roughly parallel to I-81, staying close to the interstate and crossing it in several locations. The commercial development along U.S. Route 11 tends to serve local and regional consumer needs rather than through traffic. The commercial and industrial uses along U.S. Route 11 are, however, dependent on I-81 for receiving supplies, equipment, and shipping products.

Proposed Development

There is development occurring or proposed in every county and major city in the I-81 study area. The majority of occurring or proposed development along the corridor is commercial or industrial. Notable large-scale projects being planned or constructed include new retail uses such as a Wal-Mart at Exit 14 in Washington County, and a Lowes Home Improvement store accessed via Exit 109 in Fairlawn. The City of Staunton has proposed converting the Frontier Culture Museum property to a very large-scale commercial development. Wal-Mart is also constructing a new distribution center in Rockingham County southeast of the Mt. Crawford Interchange (Exit 240). Among the new or expanded industrial parks that are being planned are the new Progress Park, a 1,200-acre park in Wythe County; and an expansion of the industrial park along Radio Road in Strasburg (Exit 296). The *I-81 Corridor Improvement Study Economics Technical Report* includes a more complete and detailed listing of projects.

Regional Economies

Population Characteristics

Using the most current data available, the total 2003 population in the cities and counties along I-81 was almost 900,000. This reflects a 38 percent increase since 1970. In comparison, Virginia, as a whole, increased more than 60 percent in the same time frame. The fastest growing areas along I-81 include Frederick County (124 percent), Warren County (119 percent), and the City of Harrisonburg (117 percent). The City of Roanoke experienced a 12 percent decline in population between 1970 and 2000.

Labor Force

In 1990, the total labor force (aged 16 to 64) for the cities and counties along the I-81 corridor was estimated at 399,500, or roughly 12 percent of Virginia's total labor force of 3.3 million. In 2000, this labor force also accounted for nearly 12 percent of Virginia's total, indicating that the labor force in the counties and cities along I-81 grew at a similar pace with the Commonwealth during the 1990s. Since 2000, however, Virginia's labor force has increased more than three times the rate of the cities and counties along I-81. This corresponds with the disparity in population growth between the cities and counties and the rest of Virginia during the same time period.

4.3.2 Rail Study Area

All the rail improvements under consideration, except for those proposed in rail section 7 at Riverton Junction, will occur within the existing rail right-of-way. For this reason, an inventory of commercial/industrial facilities and proposed development within the rail study area was limited to rail section 7. A review of aerial photographs indicates that there is little economic activity around the rail junction other than a farm.

Commercial/Industrial Facilities

There are no commercial facilities/centers or industrial parks within 500 feet of the rail line at Riverton Junction.

Proposed Development

There is no known proposed development within 500 feet of the rail line at Riverton Junction.

4.4 Agricultural Land

As discussed in Section 4.1, *Land Use*, agriculture is a predominant land use within the I-81 and rail study areas. As development has occurred in the counties through which I-81 and the rail lines travel, agricultural land has been converted to non-agricultural uses. This trend is illustrated by the 2002 Census of Agriculture, which revealed that 12 of the 13 counties along I-81 witnessed a decrease in the average size of their farms between 1997 and 2002. This section specifically discusses key farmland resources within the I-81 and rail study areas: prime farmland, farmland of statewide importance, and agricultural and forestal districts.

Impacts to prime and unique farmland, and farmland of statewide importance are subject to the requirements set forth in the Farmland Protection Policy Act (Public Law 97 – 98, 7 U.S.C. 4201) which specifically seeks to minimize the conversion of farmland to non-agricultural uses. Section 15.2-4301 of the *Code of Virginia* provides protection to agricultural and forestal districts, and stipulates that agencies of the Commonwealth encourage the maintenance of farming and forestry in districts, consistent with the promotion of human health and safety and with other federal regulations.

All these farmland resources were identified based on available GIS information and coordination with local officials and the Natural Resources Conservation Service (NRCS). Figures 5-6 and 5-7 (see Chapter 8, *Figures*) shows prime farmland and agricultural/forestal districts within a mile of either side of the I-81 and rail centerline respectively. Currently, there are no federally-designated unique farmlands in Virginia, and there are no known farmlands in the study areas that qualify as unique farmland.

4.4.1 I-81 Study Area

Prime Farmland

The United States Department of Agriculture defines prime farmland as the best land for producing food, feed, forage, fiber, and oilseed crops. Based on available GIS data, prime farmland within the I-81 study area is concentrated in the Shenandoah Valley, including Augusta, Rockingham, Shenandoah, and Frederick Counties. South of the Shenandoah Valley, prime farmlands within the I-81 study area in Smyth, Montgomery, Roanoke, and Botetourt Counties are generally smaller and scattered. According to local officials and NRCS staff, prime farmland is also present in the study area in Washington, Wythe, Pulaski, and Rockbridge Counties, but it is not depicted on Figure 5-6 because GIS data for prime farmland in these counties are not currently available. If one or more "Build" concepts (or portions of a "Build" concept) are advanced into Tier 2, additional analysis would be performed to identify prime farmlands within all counties included in the I-81 study area.

Farmland of Statewide Importance

Farmland, other than prime and unique farmland, that is of statewide importance for the production of food, feed, fiber, forage, or oilseed crops is also subject to the Farmland Protection Policy Act. Available mapping for soils of statewide importance was used to identify this resource. It includes those soils that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some of these lands may produce as high a yield as prime farmlands, if conditions are favorable.

GIS data on soils of statewide importance are available for only eight of the 13 counties within the I-81 study area: Washington, Smyth, Montgomery, Roanoke, Botetourt, Rockingham, Shenandoah, and Frederick Counties. Soils of statewide importance are within all eight counties, and are generally scattered throughout the I-81 study area. In Frederick County, soils of statewide importance are more predominant west of the study area and absent in the City of Winchester.

Agricultural/Forestal Districts

According to local planners, no districts are currently designated within the I-81 study area in Washington, Smyth, Wythe, Pulaski, Roanoke, Botetourt, Rockingham, Warren, and Frederick Counties. Within the four remaining counties listed below in Table 4.4-1, there are 12 established districts within the I-81 study area, most of which are in the Shenandoah Valley.

Table 4.4-1 Agricultural/Forestal Districts By County: I-81 Study Area

County	Districts (#)	Name of District
Montgomery	3	Montgomery -5, Montgomery-7, Montgomery-9
Rockbridge	1	Fancy Hill
Augusta	2	Bells Lane, Middle River
Shenandoah	6	Cedar Spring Run, Fishers Hill-Sandy Hook, Mt. Jackson Area, New Market Area, Tom's Brook, Woodstock West Area
Total in Study Area	12	

4.4.2 Rail Study Area

Prime Farmland

Prime farmland is scattered throughout the rail improvement sections in Smyth, Warren, Prince William, and Pittsylvania Counties. While prime farmland has been designated within Washington, Wythe, and Pulaski Counties, GIS data is not available. Therefore, prime farmland in these counties is not depicted on Figure 5-7. No prime farmland has been designated in Clarke and Fauquier Counties, two of the remaining counties within the rail

study area. If one or more "Build" concepts (or portions of a "Build" concept) are advanced into Tier 2, additional analysis would be performed to identify prime farmlands within all counties included in the rail study area.

Farmland of Statewide Importance

GIS data on soils of statewide importance are only available for one county in the rail study area, namely Washington County. Soils of statewide importance comprise a large portion of one rail improvement section in Washington County. During Tier 2, if one or more "Build" concepts (or portions of a "Build" concept) are advanced, additional analysis would be performed to identify soils of statewide importance within all counties included in the rail study area.

Agricultural and Forestal Districts

Defined by the Code of Virginia as a "public service corporation", Norfolk Southern is also subject to requirements set forth in the Agricultural and Forestal District Act of the *Code of Virginia*. Several agricultural/forestal districts are within the rail study area, particularly for those rail sections along the Piedmont rail line east of I-81 between Front Royal and Manassas in Northern Virginia. Table 4.4-2 summarizes the districts that intersect the rail sections included in the rail study area. None of the rail sections in Prince William County traverse agricultural/forestal districts. Furthermore, in the southern section of the rail study area, Pittsylvania County does not have any designated agricultural/forestal districts.

Along the Shenandoah rail line, the rail study area includes a small portion of the Gunton Park Agricultural/Forestal District in Wythe County. No districts have been designated in Washington, Smyth, and Pulaski Counties.

Table 4.4-2 Agricultural/Forestal Districts By County: Rail Study Area

Rail Section	County	Districts (#)	Name of District
4	Wythe	1	Gunton Park
6	Clarke/Warren	2	Clarke County, Rockland
9	Fauquier	2	Middleburg/Marshall, Upperville Area
10/11	Fauquier	1	The Plains
Total in Study Area		6	

4.5 Visual Quality

The existing visual environment for the study areas was reviewed in the field through a windshield survey and supplemented with GIS data, aerial photography, and USGS topographic mapping. Visual resources were also identified through review of relevant planning documents including: 1) *2002 Virginia Outdoors Plan*, 2) *2003 Heritage Virginia: Virginia's United Land Trusts' Strategic Plan for Conservation of the Commonwealth's Natural and Cultural Resources*, and 3) *1992 I-81 View Planning Project*.

For "foreground" views, sensitive visual resources within the study areas were identified within a corridor that extended 1,000 feet on either side of the existing I-81 edge of pavement or rail centerline ("foreground" view). In addition, visual resources were identified for "middleground" (1,000 feet to three miles) and "background" (beyond three miles) views.

4.5.1 I-81 Study Area

Based on background documents and scoping comments, driving on I-81 is generally considered to have visual appeal for motorists. The visual environment of I-81, both views from the road and views of the road, is defined by the region's ridge and valley topography; the cultural history and settlement patterns; and the design characteristics of the highway itself.

Views From the Road

Table 4.5-1 lists specific visual resources that are currently viewed from I-81. They include natural features such as forests, mountainous peaks that rise above the surrounding topography, rock outcroppings, scenic agricultural areas with rolling hills, and lakes and rivers, each of which contribute to the scenic viewshed from the interstate.

The George Washington and Jefferson National Forest is visible in foreground, middleground, and background views from large portions of I-81 and provides motorists with expansive views of uninterrupted forest and colorful foliage while leaves are changing in the fall. All of the rivers included in Table 4.5-1, including the New River, the James River, and the North Fork of the Shenandoah River, involve a crossing of I-81.

Table 4.5-1 Visual Resources - Views from I-81

	Distance from I-81		
Milepost	Foreground	Middleground	Background
22 - 29	Holston Farmlands		Mount Rogers and Whitetop Mountain
35	Middle Fork Holston River, Potential Virginia Scenic River[1]		Mount Rogers and Whitetop Mountain
35 - 48	Holston River Valley		Mount Rogers and Whitetop Mountain
55 - 60	George Washington and Jefferson National Forest	George Washington and Jefferson National Forest	Mount Rogers and Whitetop Mountain
89 - 94		Draper Valley	Draper Mountain
103 - 105	New River, Qualified Virginia Scenic River[1]	Claytor Lake	
118 - 128	Limestone Outcrops		George Washington and Jefferson National Forest
129	North Fork Roanoke River[1]		George Washington and Jefferson National Forest
150		Tinker Mountain	George Washington and Jefferson National Forest
152		Tinker Mountain	George Washington and Jefferson National Forest
165 - 166	James River and Gorge, Potential Virginia Scenic River[1]		George Washington and Jefferson National Forest
165-170		Purgatory Mountain/George Washington & Jefferson National Forest	Purgatory Mountain/ George Washington and Jefferson National Forest
183	Limestone Outcrops		George Washington and Jefferson National Forest
184	Buffalo Creek[1]		George Washington and Jefferson National Forest
191	Maury River, Potential Virginia Scenic River[1]		George Washington and Jefferson National Forest
250 - 288		Little North Mountain	Massanutten Mountain/ George Washington and Jefferson National Forest
269 - 270	N. Fork of Shenandoah River, Potential Virginia Scenic River[1]		George Washington and Jefferson National Forest
300	Cedar Creek, Potential Virginia Scenic River[1]		

Foreground = 0 – 1,000 feet; Middleground = 1,000 feet – 3 miles; Background = More than 3 miles
[1] Crosses I-81

Views of the Road

Table 4.5-2 lists 28 specific visual resources that, when traveled upon, are currently subject to views of I-81. These resources include recreational facilities (trails and parks), rivers, and scenic byways. Most of them are linear features within the I-81 study area that involve a physical crossing of the interstate at some point. Since the interstate already exists within the I-81 study area, users of these facilities are currently presented with views of I-81 while approaching and crossing I-81.

The George Washington and Jefferson National Forest is a multi-use property that, in addition to being a visual resource to motorists on I-81, also may present users of the trails in the forest with views of I-81, particularly when the trail crosses open land. In most areas of the forest, however, hikers on the trails may have limited views of I-81 because of dense vegetation within the forest that obstructs their view of the road. Rivers in the study area are also used for recreational purposes, resulting in views of I-81 from the river for people on various watercrafts (canoe, kayak, intertube, etc.), particularly when crossing I-81.

Other potentially sensitive visual resources, not listed below, are historic properties listed or eligible for listing on the National Register of Historic Places (see Section 4.7, *Historic Properties*). Some of these historic properties currently have unobstructed views of I-81. Others do not have views of the interstate due to a vegetative screen or other visual buffer between the historic property and the interstate.

Table 4.5-2 Visual Resources - Views of I-81

Milepost	
18	Virginia Creeper Trail[1]
18	State Route 75, Proposed Virginia Byway[1]
35	Middle Fork Holston River, Potential Virginia Scenic River[1]
45	State Route 16, Virginia Byway[1]
55	Appalachian Trail[1]
55	George Washington and Jefferson National Forest
60	US Route 749, Virginia Byway[1]
70	US Route 52, Virginia Byway[1]
81	State Route 610, Virginia Byway[1]
95	State Route 672, Proposed Virginia Byway[1]
95	New River Trail State Park[1]
103 - 105	New River, Qualified Virginia Scenic River[1]
114	State Route 8, Proposed Virginia Byway[1]
129	North Fork Roanoke River[1]
140	US Route 311, Virginia Byway[1]
152	Appalachian Trail[1]
165 - 166	James River Potential Virginia Scenic River[1]

Table 4.5-2 Visual Resources - Views of I-81 (Cont'd)

Milepost	
166	US Route 43, Virginia Byway[1]
180	US Route 11, Virginia Byway[1]
184	Buffalo Creek[1]
191	Maury River, Potential Virginia Scenic River[1]
205	State Route 606, Virginia Byway[1]
269 - 270	N. Fork of Shenandoah River, Potential Virginia Scenic River[1]
270	State Route 767, Virginia Byway[1]
273	US Route 263, Virginia Byway[1]
280	State Route 675, Virginia Byway[1]
297	US Route 55, Virginia Byway[1]
300	Cedar Creek, Potential Virginia Scenic River[1]

[1] Crosses I-81

4.5.2 Rail Study Area

Since passenger rail service does not exist in the rail study area, the inventory focused on views of the rail from visual resources in the rail study area.

The rail study area passes through largely undeveloped pasture and forested land, occasionally passing through small towns. Table 4.5-3 summarizes visual resources that are currently subject to views of the railroad lines. Although most of these resources do not cross the railroad, they are in close proximity to the rail line, affording users of the facilities views of the railroad in those areas where a visual buffer is not present between the rail and the resource. Since the rail sections already exist within the rail study area, users of these facilities are currently presented with views of the rail line.

Table 4.5-3 Visual Resources – Views of the Rail

Rail Section	Foreground
4	George Washington and Jefferson National Forest
5	State Route 7, Virginia Byway[1]
7	S. Fork of the Shenandoah River, Potential Virginia Scenic River
8	State Route 55, Virginia Byway and Appalachian Trail
9	Goose Creek, Potential Virginia Scenic River

[1] Crosses I-81

Other potentially sensitive visual resources with views of the rail include historic properties that are listed or eligible for listing on the National Register of Places (see Section 4.6, *Historic Properties*). Some of these historic properties currently have unobstructed views of the rail while others cannot view the rail due to the presence of a vegetative screen or other visual buffer.

4.6 Parks, Recreation Areas and Open-Space Easements

This section describes existing parks, recreation areas, and open-space easements within the I-81 and rail study areas based on readily available mapping and GIS data, review of local comprehensive plans and other documents (*e.g.*, *Virginia Outdoors Plan*, 2000) and coordination with local parks and recreation directors. Information was obtained on the location and ownership of publically-owned parks, trails, Section 6(f) resources, wildlife or waterfowl refuges, and boat ramps. Information on privately-owned parks and recreational facilities was not obtained for inclusion in the Tier 1 Draft EIS. Since they may also serve a recreational function, open-space easements administered by the Virginia Outdoors Foundation were also identified.

Use of publicly-owned parks, recreation areas and wildlife/waterfowl refuges are subject to the requirements set forth in Section 4(f) of the Department of Transportation Act of 1966 as described in Chapter 5, Section 5.8. Based on available GIS information, no public boat ramps or wildlife/waterfowl refuges are within the study areas. Publicly-owned parks, recreation areas and open-space easements are shown in Figure 5-6 (see Chapter 8, *Figures*).

4.6.1 I-81 Study Area

The I-81 study area contains 15 existing local, state and federal parks and recreation areas, as well as five open-space easements. Several local parks and recreation facilities are also proposed along I-81. Table 4.6-1 below summarizes this information.

Table 4.6-1 Parks, Recreation Areas, and Open-Space Easements: I-81 Study Area

	Milepost	County/City	Notes
Federal Ownership			
Appalachian National Scenic Trail[1]	55 and 150	Smyth, Botetourt	Crosses I-81 twice; Rt. 220 once
George Washington and Jefferson National Forest[1]	55	Smyth	
State Ownership			
New River Trail State Park	95	Pulaski	Trail
Pedlar Hills Natural Area Preserve	128	Montgomery	Public trails planned
Local Ownership			
Mendota Trail	4	City of Bristol	Proposed Trail
Suncrest Park	7	City of Bristol	
Virginia Creeper Trail[2]	18	Washington (Town of Abingdon)	
Chilhowie Town Park	36	Town of Chilhowie	
Beverly Heights Park	136	City of Salem	
Hanging Rock Battlefield Trail	141	City of Salem/Roanoke	
Ramblewood Fields Softball Complex	245	City of Harrisonburg	
Undeveloped Property	245	City of Harrisonburg	Proposed Park
Purcell Park[1]	246	City of Harrisonburg	
New Market Town Park	265	Town of New Market	
New Market Battlefield Park[1]	267	Town of New Market/ Shenandoah	
Mount Jackson Park	273	Town of Mount Jackson	
Fairview Park	286	Town of Woodstock	Proposed Park
Jim Barnett Park	315	City of Winchester	
Open-Space Easements			
5	187, 237 294, 301, 317	Rockbridge, Augusta, Shenandoah, Frederick (2)	

Sources: DCR, VDHR, USGS, VOF, VDGIF, ATC, NPS and local data
[1] 6(f) properties
[2] Also owned by USDA Forest Service and others (see below)

Federal Parks and Recreation Areas

Appalachian National Scenic Trail

The Appalachian National Scenic Trail, is a continuous, marked, 75-year-old footpath that extends approximately 2,167 miles across the Appalachian Mountain chain through 14 states from Maine to Georgia. The National Trails System Act and the Virginia Appalachian Trail Act authorized federal land acquisition to establish a permanent route, a protective corridor

surrounding the footpath, and encourages protection of the Trail as part of the National Scenic Trails System. The Trail is administered by the National Park System in cooperation with the USDA Forest Service, numerous state agencies (including the Virginia Department of Conservation and Recreation), the Appalachian Trail Conference, and the Conference's 31 affiliated trail clubs. The Appalachian Trail, a National Scenic Trail, crosses I-81 in Smyth County just west of the Wythe County Line near Exit 54 and again in southern Botetourt County near Exit 150. Within the study area, it also crosses U.S. Route 220 at Daleville, just north of Exit 150.

Virginia Creeper Trail

The Virginia Creeper Trail, a designated National Recreation Trail, is an approximately 34-mile bicycle, pedestrian, and horseback trail that crosses I-81 near Exit 17 in the Town of Abingdon, Washington County. The Virginia Creeper Trail is a rails-to-trails project that extends from the Town of Abingdon to the Town of Damascus, through the George Washington and Jefferson National Forest, and into North Carolina. It is owned by the Town of Abingdon, the Town of Damascus, the USDA Forest Service, and by various private owners. Where the trail crosses I-81, it is owned by the Town of Abingdon.

George Washington and Jefferson National Forest

The George Washington and Jefferson National Forest is in Smyth County on both sides of I-81 along the Appalachian National Scenic Trail, just west of the Wythe County line. The National Forest generally extends the entire length of Virginia's western boundary in several non-contiguous sections, and is generally west of I-81. The USDA's Forest Service administers the 1.7 million-acre National Forest in Virginia. This National Forest constitutes nearly 50 percent of the public outdoor recreation land in the Commonwealth of Virginia, with 17 designated wilderness areas, comprehensive equestrian trail systems, campgrounds, a range of trail types and lengths, and support facilities for horse riders.

State Parks and Recreation Areas

New River Trail State Park

The New River Trail State Park crosses I-81 north of Exit 94, east of the Town of Pulaski in Pulaski County. This 57-mile long state park, paralleling the New River, serves as a link to other outdoor recreational areas such as a town park in Fries, Mount Rogers National Recreational Area, four Department of Game and Inland Fisheries' boat launches, and the Shot Tower Historical State Park. The Millrace and Cliffview Campgrounds are accessible along the trail by foot for primitive tent camping. Other locations are for day use only.

Pedlar Hills Natural Area Preserve

The Pedlar Hills Natural Area Preserve, also known as Pedlar Hills Glades, is east of I-81 near the Town of Blacksburg in Montgomery County. It is near Exit 128 at State Route 603 (Northfork Road). The Pedlar Hills Natural Area Preserve, owned and managed by the Virginia Department of Recreation and Conservation (DCR), is noted for a rare natural community called a dolomite barren, which supports uncommon and rare plant species. Currently, Pedlar Hills Natural Area Preserve is not open to the public. However, a hiking trail is planned, pending acquisition of an easement.

Local/Regional Parks and Recreation Areas

Chilhowie Town Park

Chilhowie Town Park is an approximately 20-acre facility in Smyth County owned by the Town of Chilhowie. Chilhowie Town Park contains baseball fields, picnic shelters, a stage area, bathrooms, and a playground, and is west of I-81 near Exit 35 at State Route 107 and Railroad Avenue. The town recently received a Transportation Equity Act for the 21st Century (TEA-21) grant to build a walking trail around the park that would connect with a nearby tourist center.

Ramblewood Fields Softball Complex and Adjacent Proposed Park

The Ramblewood Fields Softball Complex is owned by the City of Harrisonburg and is east of I-81 between Exits 243 and 245. This was formerly a landfill site that lies partly within the City of Harrisonburg and partly within Rockingham County. An undeveloped parcel adjacent to this softball field complex is a proposed park site; however, no plans exist for this parcel and development is not anticipated to occur for 5-10 years.

Purcell Park

Purcell Park is also owned by the City of Harrisonburg and is west of I-81 near Exit 245 in Harrisonburg. Purcell Park is a 67-acre park that contains three softball/baseball fields, four tennis courts, two playground areas, three picnic shelters, several restrooms, and a 1.5-mile walking trail. This park has used Land and Water Conservation funds for improvements within the park.

New Market Town Park

New Market Town Park is owned by the Town of New Market and is east of I-81, southeast of Exit 264, at the southern end of Cadet Road in the Town of New Market. New Market Town Park is a 24-acre park that contains two baseball diamonds, jungle gyms with swings, a

walking path, six picnic shelters, a barbeque pit, skate park, soccer field, five tennis courts, two basketball courts, volleyball courts, a band stand, and a community swimming pool.

New Market Battlefield Park

New Market Battlefield Park is owned by the Virginia Military Institute and is a Section 6(f) resource that is west of I-81 near Exit 264. It is in Shenandoah County, partly within the New Market town limits. New Market Battlefield Park is a historic point of interest, known as the site of the 1864 Battle of New Market, where Virginia Military Institute Cadets fought with Confederate forces against the Union Army.

Mount Jackson Park

Mount Jackson Park is owned by the Town of Mount Jackson in Shenandoah County, and is east of I-81 between Exit 273 and State Route 263. The park contains a swimming pool, tennis courts, a baseball field, basketball courts, a playground, and a picnic shelter.

Fairview Park (Proposed)

The proposed Fairview Park (also known as the Whetzel Property) straddles I-81 north of the Town of Woodstock between Exits 283 and 291 at North Street. According to town officials, a plan for the park has not been developed. However, according to the Shenandoah County Master Indoor/Outdoor Recreation Plan, the 50-acre proposed park is one of the potential sites for two youth soccer fields.

Jim Barnett Park

Jim Barnett Park (formerly Winchester Recreation Park) is an approximately 250-acre facility owned by the City of Winchester. It is located at 1001 East Cork Street west of I-81, north of Exit 313. It was designed for diversified use by large groups, such as league play and group picnics. Facilities include the War Memorial Building with meeting rooms, administrative offices for the Winchester Parks and Recreation Department, arts and crafts classrooms, physical fitness rooms, handball/squash courts, and a regulation-size indoor swimming pool. The park also includes picnic pavilions, lighted ballfields, tennis courts, horseshoe pits, miniature golf, volleyball courts, paddleball facilities, a playscape, a fishing lake, and an outdoor performance amphitheater. Planned improvements for the park include additional land acquisition in the northwest corner of the park (which is on the opposite side of I-81), athletic field renovation, amphitheater improvements, redesign of vehicle access and parking, and development of an indoor activity center west of the War Memorial Building.

Other Local Parks/Recreation Areas

A number of smaller local parks are distributed along I-81 as listed below and depicted on Figure 5-6 including:

- Proposed Mendota Trail – City of Bristol

- Suncrest Park – City of Bristol
- Beverly Heights Park – City of Salem
- Hanging Rock Battlefield Trail – Roanoke County

Open-Space Easements

As defined in Section 10.1-1700 of the Open-Space Land Act of the *Code of Virginia,* an open-space easement is "a nonpossessory interest of a public body in real property, whether easement appurtenant or in gross, acquired through gift, purchase, devise, or bequest imposing limitations or affirmative obligations, the purposes of which include retaining or protecting natural or open-space values of real property, assuring its availability for agricultural, forestal, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural or archaeological aspects of real property." There are five open-space easements in the I-81 study area, in Rockbridge, Augusta, Shenandoah, and Frederick Counties.

4.6.2 Rail Study Area

Based on communication with local planning officials and available GIS data, there are no known local parks or recreation areas within the rail study area. The only state and federal park resources identified include the George Washington and Jefferson National Forest in the Pulaski County rail improvement area, and the Appalachian National Scenic Trail in Fauquier County (rail section 8). In addition, four open-space easements are within the rail study area, one each in Clarke, Warren, Fauquier, and Prince William Counties.

4.7 Historic Properties

For purposes of this study, historic properties were defined as properties that are either listed on or formally determined eligible for the Virginia Landmarks Register (VLR) and/or the National Register of Historic Places (NRHP) by the Virginia Department of Historic Resources (VDHR), or that may be potentially eligible for listing, warranting further study during Tier 2 studies, if a "Build" concept (or portions of a "Build" concept) is advanced. In Virginia, VDHR serves as the State Historic Preservation Office (SHPO) for the purposes of National Historic Preservation Act of 1966 and related regulations. An eligible property is any district, site, building, structure, or object that meets the National Register's Criteria for Evaluation.

This chapter focuses primarily on historic properties that are either listed or have been formally determined eligible for listing on the VLR and/or the NRHP. An inventory was also taken of historic properties that appeared potentially eligible for listing on the NRHP. Totaling almost 200, potentially eligible resources have not been formally evaluated for eligibility as part of this Tier 1 analysis. This study process also does not include the actual field identification of previously unrecorded or unevaluated resources. If one or more "Build" concepts (or portions of a "Build" concept) are advanced, Tier 2 would include additional efforts to identify historic resources.

For purposes of inventorying historic properties, the width of the study area varied. Like other resources, archaeological sites were inventoried within 500 feet on either side of the I-81 edge of pavement or rail center line. However, because architectural resources outside of the construction limits but within view of a project could be visually impacted, architectural properties were inventoried 1,000 feet on either side of the I-81 edge of pavement or rail center line. Historic architectural resources within this 2,000-foot wide corridor were assumed to be visible from the interstate or rail line. In addition, historic architectural properties that may be within view even beyond the 2,000-foot corridor were also identified.

Identification of previously recorded historic properties within the study areas involved background research at VDHR, including review of archival, cartographic, and other primary sources. The majority of previously recorded historic resources have not been evaluated for eligibility. A preliminary field survey was conducted to preliminarily comment on the eligibility of those resources and to locate additional architectural resources that appear to be potentially eligible for the NRHP.

More detailed information on the methods used to inventory all historic properties for this study is included in the *I-81 Corridor Improvement Study Historic Properties Technical Report*.

The level of resource identification and analysis undertaken for the Tier 1 study does not fully satisfy the requirements of Section 106 of the National Historic Preservation Act of 1966, as amended. If one or more "Build" concepts (or portions of "Build" concepts) are advanced into Tier 2, compliance with Section 106 would occur during additional investigations to:

- Identify additional properties that may be potentially eligible, including archaeological sites;
- Determine the eligibility of potentially eligible resources through additional field reconnaissance, research, and coordination with the VDHR; and
- Determine the effects on historic properties.

For archaeological resources, subsurface investigations would be conducted in areas that potentially contain archaeological resources. If any of these resources appear potentially eligible for the NRHP, they would be evaluated to determine if they meet the criteria for eligibility for the NRHP.

4.7.1 I-81 Study Area

Figure 4-3 (see Chapter 8, *Figures*) shows the location of previously recoreded architectural resources (buildings, structures, and districts) and battlefields within the I-81 study area that are either listed or have been determined eligible for listing on the VLR or NRHP. Potentially eligible architectural resources are described in the *Historic Properties Technical Report*.

NHRP Listed and Determined Eligible Architectural Resources

Approximately 930 individual architectural resources are recorded at VDHR within the I-81 study area. This includes resources that have: 1) not been evaluated for eligibility, 2) been determined not eligible, 3) been determined potentially eligible, 4) been determined eligible, 5) been destroyed, or 6) been listed on the VLR or NRHP. A large number of these (approximately 635) have not been evaluated for eligibility. A complete list of these resources is provided in the *Historic Properties Technical Report*.

Architectural resources described in this section include buildings and structures, as well as historic districts, that are either listed or determined eligible for listing on the VLR or NRHP.

Buildings and Structures

As summarized in Table 4.7-1, 52 buildings and structures, either listed or determined eligible, have been previously recorded at VDHR within 1,000 feet of either side of the I-81 edge of pavement. An additional 16 were located beyond the 2,000-foot buffer, but possibly within view of I-81. Resources listed in Table 4.7-1 include homes, farms, bridges, cemeteries, schools, and commercial areas.

Table 4.7-1 Listed and Determined Eligible Buildings and Structures: I-81 Study Area

Town, City or County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation	Within 2,000-ft Corridor
Washington	095-0021	The Grove	Wyndale	NRHP/VLR	No
Washington	095-0102	Old Stagecoach Inn	Glade Spring	Eligible	Yes
Smyth	086-0010	Seven Mile Ford RR Depot	Chilhowie	Eligible	No
Smyth	086-0013	Aspenvale Cemetery	Chilhowie	NRHP/VLR	No
Town of Chilhowie	189-0003	Bonham, H. L. House	Chilhowie	NRHP/VLR	Yes
Smyth	086-0003	Preston, John House	Marion	NRHP/VLR	Yes
Smyth	086-5024	Marion Diner	Marion	Eligible	Yes
Town of Marion	119-0004	Southwestern State Hospital (Henderson Building)	Marion	NRHP/VLR	No
Smyth	086-0002	Old Stone Tavern	Atkins	NRHP/VLR	Yes
Smyth	086-0088	Hancock House, U.S. Route 11	Atkins	Eligible	Yes
Smyth	086-0001	Gammon House	Rural Retreat	Eligible	Yes
Wythe	098-0137	House, RT. 693	Crockett	Eligible	Yes
Wythe	098-0018	Saint John's Lutheran Church	Wytheville	NRHP/VLR	Yes
Wythe	098-0005	Fort Chiswell Mansion	Max Meadows	NRHP/VLR	Yes
Wythe	098-0022	McGavock Family Cemetery	Max Meadows	NRHP/VLR	Yes
Wythe	098-0026	Fort Chiswell Site	Max Meadows	NRHP/VLR	Yes
Pulaski	077-5068	NC Branch, N&W Railway	Dublin	Eligible	Yes
Montgomery	060-0137	Charleton, James House	Riner	NRHP/VLR	Yes
Roanoke	080-0025	Pleasant Grove	Glenvar	NRHP/VLR	Yes
Roanoke	080-0479	Red Barn Antiques	Glenvar	Eligible	Yes
Roanoke	080-0005	Brubaker House	Salem	Eligible	Yes
Roanoke	080-5096	Carvin's Cove Water Filtration Plant	Roanoke	Eligible	Yes
Botetourt	011-5034	Thomas Kinzie House	Daleville	NRHP/VLR	Yes
Botetourt	011-5096	Blue Ridge Hall	Villamont	Eligible	Yes
Botetourt	011-0010	Greyledge	Buchanan	NRHP/VLR	Yes
Rockbridge	081-0207	Forest Tavern	Natural Bridge	NRHP/VLR	Yes
Rockbridge	081-0399	Rockbridge Inn	Natural Bridge	NRHP/VLR	Yes
Rockbridge	081-0015	Fancy Hill	Glasgow	NRHP/VLR	Yes
Rockbridge	081-0180	Springdale; E. M. Dixon House	Glasgow	Eligible	Yes

Table 4.7-1 Listed and Determined Eligible Buildings and Structures: I-81 Study Area (Cont'd)

Town, City or County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation	Within 2,000-ft Corridor
Rockbridge	081-0041	Maple Hall	Cornwall	NRHP/VLR	Yes
Rockbridge	081-0065	Church Hill	Cornwall	NRHP/VLR	Yes
Rockbridge	081-0066	Timber Ridge Presbyterian Church	Cornwall	NRHP/VLR	No
Rockbridge	081-0073	McCormick, Cyrus, Farm and Workshop	Vesuvius	NRHP/VLR/NHL	No
Augusta	007-0604	Alexander, James House	Vesuvius	NRHP/VLR	Yes
Augusta	007-0001	Annandale	Stuarts Draft	Eligible	Yes
Augusta	007-0041	Valley Railroad Stone Bridge	Stuarts Draft	NRHP/VLR	Yes
Staunton	132-0045	Bridge 1026	Staunton	Eligible	Yes
Augusta	007-1207	DeJarnette Center	Staunton	Eligible	No
Augusta	007-0241	Augusta Military Academy	Fort Defiance	NRHP/VLR	No
Augusta	007-0333	Fort Defiance Railroad Station/Depot	Fort Defiance	Eligible	Yes
Augusta	007-0028	Rainey, Garlan House	Mount Sidney	NRHP/VLR	No
Rockingham	082-0062	Contentment	Mount Sidney	NRHP/VLR	Yes
City of Harrisonburg	115-0103	James Madison University	Harrisonburg	Eligible	No
City of Harrisonburg	115-5032	David Liskey House	Harrisonburg	Eligible	Yes
Rockingham	082-0003	Bethlehem Church	Tenth Legion	NRHP/VLR	Yes
Shenandoah	085-0027	New Market Battlefield Park	New Market	NRHP/VLR	Yes
Shenandoah	085-0103	Meems Bottom Covered Bridge	New Market	NRHP/VLR	No
Town of New Market	269-5002	Shirley House	New Market	Eligible	Yes
Shenandoah	085-0029	Snapp House	Toms Brook	NRHP/VLR	Yes
Shenandoah	085-0470	Pifer House at Vesper Hall	Middletown	Eligible	Yes
Shenandoah	085-0004	Fort Bowman	Middletown	NRHP/VLR	Yes
Shenandoah	085-0013	Stickley, Daniel Farm	Middletown	Eligible	Yes
Shenandoah	085-0014	Stickley Mill	Middletown	Eligible	Yes
Town of Middletown	034-0014	Monte Vista Farm	Frederick	NRHP/VLR	Yes
Frederick	034-0080	Indian Spring	Stephens City	Eligible	Yes
Frederick	034-0126	Hillandale	Stephens City	Eligible	Yes
Frederick	034-0127	Springdale	Stephens City	NRHP/VLR	Yes
Frederick	034-0128	Springdale Flour Mill	Stephens City	NRHP/VLR	Yes

Table 4.7-1 Listed and Determined Eligible Buildings and Structures: I-81 Study Area (Cont'd)

Town, City or County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation	Within 2,000-ft Corridor
Frederick	034-0160	Kline's Mill	Stephens City	Eligible	No
Frederick	034-0300	Family Drive-In	Stephens City	Eligible	Yes
Frederick	034-0314	Zig-Zag Trenches	Stephens City	Eligible	Yes
Frederick	034-0134	Hackwood	Winchester	Eligible	Yes
Frederick	034-0135	Godfries-Semples House	Winchester	Eligible	Yes
Frederick	034-0424	Bowles-Garber Farm	Winchester	Eligible	Yes
Frederick	034-1448	Clevenger-McKown House	Winchester	Eligible	No
Frederick	034-0113	Kenilworth	Stephenson	Eligible	Yes
Frederick	034-0114	Zinn House	Stephenson	Eligible	No
Frederick	034-0006	Hopewell Friends Meeting House	Inwood	NRHP/VLR	No
Frederick	034-0137	Branson House	Inwood	Eligible	No

NHL – National Historic Landmark
NRHP – National Register of Historic Places
USGS – United States Geological Survey
VLR – Virginia Landmarks Register

In addition, based on the preliminary field survey, other buildings and structures were identified that appear to be potentially eligible for listing on the National Register. A complete list of these is provided in the *Historic Properties Technical Report*.

Historic Districts

Nine historic districts either listed or determined eligible for listing have been previously recorded within the I-81 study area and are listed in Table 4.7-2. In addition, Sellers Mill Historic District in Rockingham County (VDHR Number 082-5077) is located outside of the 2,000-foot corridor but possibly within view of I-81.

Table 4.7-2 Listed and Determined Eligible Historic Districts: I-81 Study Area

Town, City or County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation	Within 2,000-ft Corridor
Washington	095-0098	Emory and Henry College Historic District	Glade Spring	NRHP/VLR	Yes
Town of Chilhowie	189-0001	Downtown Chilhowie Historic District	Chilhowie	NRHP/VLR	Yes
Pulaski	077-0022	New Bern Historic District	Dublin	NRHP/VLR	Yes
Town of Buchanan	180-0028	Buchanan Historic District	Buchanan	NRHP/VLR	Yes
Rockingham	082-5077	Sellers Mill Historic District	Tenth Legion	Eligible	No
Town of Mt. Jackson	265-0004	Mt. Jackson Historic District	New Market	NRHP/VLR	Yes
Town of New Market	269-0005	New Market Historic District	New Market	NRHP/VLR	Yes
Town of Middletown	260-5001	Middletown Historic District	Middletown	NRHP/VLR	Yes
Frederick	034-5036	Camp Russell Historic District	Stephens City	Eligible	Yes
Town of Stephens City	304-0001	Newton/Stephensburg Historic District	Stephens City	NRHP/VLR	Yes
Washington	095-0098	Emory and Henry College Historic District	Glade Spring	NRHP/VLR	Yes

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

Battlefields

The Civil War Sites Advisory Commission (CWSAC) was established in 1990 to identify the nation's significant Civil War sites, determine their relative importance and condition, assess threats to their integrity, and recommend alternatives to preserve and interpret them. The CWSAC defined "core areas" and "study areas" for each battle which were used to define boundaries. According to the CWSAC, both the core areas and the study areas are assumed to be eligible for the NRHP unless they are documented to have lost integrity.

The Shenandoah Valley battlefields were studied by the National Park Service (NPS), and the principal Shenandoah Valley sites are included in the CWSAC's inventory. The maps defining the boundaries of Civil War battles within the Shenandoah Valley Battlefield National Historic District (SVBNHD) were provided by the Shenandoah Valley Battlefield Foundation. The district was established by Congress to provide a mechanism to promote tourism, education, research, and preservation. The SVBNHD is classified by the National Park Service as a "national heritage area" and, as a whole, has not been listed or determined eligible for the National Register.

Battlefields within the SVBNHD extend over eight counties in northwestern Virginia. I–81 traverses five of the eight counties, namely, Augusta, Frederick, Rockingham, Shenandoah, and Warren. I–81 traverses all four battlefields in Shenandoah County, which account for more than 40 percent of the district's battlefield acreage. Additionally, the district's largest

battlefield, Cedar Creek, is traversed by I–81 in Shenandoah, Warren, and Frederick Counties. In October 2000, the SVBNHD Commission adopted a management plan to preserve the district's integrity, to protect and interpret the district's resources, and to foster public awareness of the Valley's legacy.

The battles in the southern Valley are noted on CWSAC/NPS maps available at VDHR. These maps have been reviewed, and the boundaries defined where possible. The ten battlefields in the study area are listed in Table 4.7-3.

Table 4.7-3 Civil War Battlefields: I-81 Study Area

County	VDHR Number	Battlefield Name	Part of CWSAC Survey	Year of Engagement	Listing or VDHR Evaluation
Frederick	138-5005	Winchester 1	Yes	1862	
Frederick	None	Kernstown 1	Yes	1862	n/a
Frederick	None	Kernstown 2	Yes	1862	n/a
Smyth	None	Marion	Yes	1864	n/a
Shenandoah	269-5001	New Market	Yes	1864	
Shenandoah	085-5045	Tom's Brook	Yes	1864	
Shenandoah	085-0001	Fisher's Hill	Yes	1864	
Frederick, Shenandoah, and Warren	034-0303/034-0002	Cedar Creek	Yes	1864	NHRP/VLR/NHL
Frederick	034-0456	Opequon (Winchester 3)	Yes	1864	Eligible
Roanoke	080-5023	Hanging Rock	No	1864	Eligible

CWSAC – Civil War Sites Advisory Commission
NHL – National Historic Landmark
NRHP – National Register of Historic Places
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

National Historic Landmarks

A National Historic Landmark (NHL) is a NRHP-eligible property that also meets a more stringent set of criteria. An NHL has national significance and "possess exceptional value or quality in illustrating or interpreting the heritage of the United States in history, architecture, archaeology, engineering, and culture (*Code of Federal Regulations, Title 36, and Part 65*). Today, fewer than 2,500 historic places bear this national distinction. Three properties in the I-81 study area have been specifically designated as NHLs. Each property is also listed on the Virginia Landmarks Register. All three NHL's are listed below in Table 4.7-4.

Table 4.7-4 National Historic Landmarks: I-81 Study Area

County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation
Rockbridge	081-0073	Cyrus McCormick Farm and Workshop	Vesuvius	NRHP/VLR/NHL
Frederick/Warren	034-0002	Belle Grove and Cedar Creek	Strasburg/Middletown	NRHP/VLR/NHL
Frederick	034-0303	Cedar Creek Battlefield	Middletown	NHRP/VLR/NHL

NHL – National Historic Landmark
NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

Historic Easements

Historic preservation easements are granted to the Virginia Board of Historic Resources and are administered by VDHR. A historic preservation easement is a voluntary legal agreement allowing the donor to retain ownership and possession of a historic landmark, while granting someone else the authority to protect the historic, architectural, and archaeological features. An easement contains perpetual covenants that obligate the owner to refrain from actions that are incompatible with the preservation of the landmark. The covenants pass with the title to the land and bind all subsequent owners. One historic preservation easement has been granted within the I-81 study area (see Table 4.7-5).

Table 4.7-5 Historic Easements: I-81 Study Area

County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation
Frederick	034-0303	Cedar Creek Battlefield	Middletown	NRHP/VLR/Easement

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

NHRP Listed and Eligible Archaeological Sites

Roughly 115 archaeological sites have previously been identified in the corridor to date and recorded at VDHR. Of these, only one has been listed or determined eligible for listing on the VLR or NRHP as shown on Table 4.7-6. This site has not been depicted on any figures for reasons of confidentiality.

Table 4.7-6 Listed and Determined Eligible Archaeological Sites: I-81 Study Area

County	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation
Wythe	44WY0019	Fort Chiswell Site	Max Meadows	NRHP/VLR

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

The vast majority of archaeological sites in the study area have not been evaluated for National Register eligibility. A total of three previously identified archaeological sites were determined potentially eligible for listing on the NRHP. All previously recorded sites are listed in the *Historic Properties Technical Report*.

4.7.2 Rail Study Area

Figure 4-4 (see Chapter 8, *Figures*) shows the location of architectural resources (buildings, structures, and districts) and battlefields within the rail study area that are either listed or that have been determined eligible for listing on the VLR or NRHP. Because not all of the rail sections have historic properties, Figure 4-4 does not include all 13 rail sections. Potentially eligible architectural resources are described in the *Historic Properties Technical Report*.

NHRP Listed and Eligible Architectural Resources

Approximately 95 individual architectural resources and districts are recorded at VDHR within the rail study area. This includes resources that have: 1) not been evaluated for eligibility, 2) been determined not eligible, 3) been determined potentially eligible, 4) been determined eligible, 5) been destroyed, or 6) been listed on the VLR or NRHP. A complete list of these resources is provided in the *Historic Properties Technical Report*. Architectural resources described in this section include buildings and structures, as well as historic districts, that are either listed or determined eligible for listing on the VLR or NRHP.

Buildings and Structures

Six listed or determined eligible buildings and structures have been previously recorded in the rail study area as listed in Table 4.7-7 on the following page.

Table 4.7-7 Listed and Determined Eligible Buildings and Structures: Rail Study Area

County	Rail Section	VDHR Number	Resource Name	USGS Quadrangle	Listing or VDHR Evaluation
Clarke	5	021-0073	Soldiers Rest	Berryville	NRHP/VLR/Easement
Warren	6	093-0063	Front Royal Country Club	Front Royal	NRHP/VLR
Warren	7	093-0057	Lackawanna	Front Royal	Eligible
Warren	8	093-0114	Linden House #2	Linden	Eligible
Prince William	11	076-0002	Beverley Mill	Thoroughfare Gap	NRHP/VLR
Pittsylvania	13	071-0025	Mountain View	Chatham	NRHP/VLR

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

Historic Districts

Seven historic districts either listed or determined eligible for listing have been previously recorded within the rail study area as listed in Table 4.7-8.

Table 4.7-8 Listed and Determined Eligible Historic Districts: Rail Study Area

County	Rail Section	VDHR Number	District Name	USGS Quadrangle	Listing or VDHR Evaluation
Clarke	5	168-0012	Berryville Historic District	Berryville	NRHP/VLR
Clarke	5	021-0967	Long Marsh Run Rural Historic District	Berryville	NRHP/VLR
Clarke	6	021-0963	Greenway (Rural) Historic District	Stephens City	NRHP/VLR
Warren	7	112-0055	Front Royal Historic District	Front Royal	NRHP/VLR
Warren	7	112-5328	Riverton Historic District	Front Royal	NRHP/VLR
Fauquier	9	030-5369	Crooked Run Valley Rural Historic District	Upperville	NRHP/VLR
Fauquier	10	311-5001	The Plains Historic District	Marshall	Eligible

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

Civil War Battlefields

In addition to the information gained from the Shenadoah Valley Battlefield Foundation, as noted in the discussion of the I-81 study area, most of the information on the battlefields in the rail study area was obtained from the maps of the Civil War Sites Advisory Commission. Not all of the battlefields have been recorded with VDHR numbers. The battlefields in the rail study area are listed in Table 4.7-9.

Table 4.7-9 Civil War Battlefields: Rail Study Area

County	Rail Section	Associated VDHR Number	Battlefield Name	Year of Engagement
Smyth	2	none	Marion	1864
Clarke	5	none	Berryville	1864
Warren	7	093-0160	Front Royal	1862
Warren	7	093-0530	Guard Hill	1864
Warren	8	093-0531	Wapping Heights Battle Site	1863
Fauquier/Prince William	11	030-1016	Thoroughfare Gap	1862

VDHR – Virginia Department of Historic Resources

National Historic Landmarks

There are no National Historic Landmarks within the 13 rail improvement sections.

Historic Easements

One historic easement is located in the rail study area, in rail improvement section 5. In addition to being listed in Table 4.7-7, it is listed in Table 4.7-10.

Table 4.7-10 Historic Easements: Rail Study Area

County	Rail Section	VDHR Number	Resource Name	USGS Quadrangle	VDHR Evaluation
Clarke	5	021-0073	Soldiers Rest	Berryville	NRHP/VLR/Easement

NRHP – National Register of Historic Places
USGS – United States Geological Survey
VDHR – Virginia Department of Historic Resources
VLR – Virginia Landmarks Register

NHRP Listed and Eligible Archaeological Sites

Approximately 17 archaeological sites have been previously recorded within the rail study area. Of the three sites that have beeen evaluated for National Register eligibility, two sites were found not eligible and one site within rail improvement section 12 in Prince William County (Site 44PW0587) was determined eligible for listing.

4.8 Physical and Natural Resources

The following sections provide a summary of the physical and natural resources within the study areas based primarily on available GIS information, the Scoping Process, and windshield surveys. Figures 5-8 and 5-9 in Chapter 8, *Figures* depict existing natural resources within a mile of either side of the I-81 and rail centerline respectively, including wetlands, perennial streams, floodplains, trout streams, and threatened and endangered species. The *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report* contains additional detailed information on the methods used to identify and analyze wetland and water resources, as well as the results of the analysis.

4.8.1 I-81 Study Area

Geology

The geologic conditions along the I-81 study area greatly influence the natural resources found within the study area. These conditions are briefly summarized below.

Physiography and Topography

The I-81 study area lies within the Valley and Ridge physiographic province which consists of parallel ridges and valleys underlain by folded and faulted Paleozoic sedimentary rock. Major portions of I-81 run through a physiographic subprovince called the Great Valley. North of Staunton, the Great Valley is more commonly referred to as the Shenandoah Valley. The valleys within the province are underlain primarily by limestone and dolostone, whereas the ridges consist of more resistant sandstone, siltstone, and shale. These elongated geologic structures produce a trellis (branching) drainage system, resulting in a relatively large number of streams occuring in the study area.

Topography varies considerably throughout the I-81 study area, ranging from 1,000 to 4,000 feet above mean sea level (MSL) in the Valley and Ridge Province. Broad valleys with low to moderate slopes indicative of the Great Valley produce elevations between 500 and 1,500 feet above MSL north of Roanoke, to a range of 1,200 to 2,300 feet above MSL to the south. In the northern portion of the I-81 study area, a series of long linear ridges rise to 3,000 feet above the Great Valley. As a result of this topography, wetland systems are less prominent in the I-81 study area than areas with flatter terrain in the Piedmont and Coastal Plain provinces east of I-81. In addition to posing design constraints, areas of steep topography along the corridor are also more prone to sedimentation, a factor that affects water quality in streams and rivers.

Karst Topography

Well-developed karst topography is characteristic of the Great Valley. Karst topography is a landscape developed in limestone, dolomite, or other soluble rocks. It is characterized by subsurface drainage systems, sinking or losing streams, sinkholes, springs, and caves. Karst terrain covers a considerable amount of the Valley and Ridge Province, occuring in at least 29 counties in western Virginia. Much of I-81 traverses areas where karst topography is prevalent.

Because of their characteristic network of underground drainage flows, karst landscapes are often an important drinking water supply. Areas such as caves, springs and seeps, and spring-fed streams also support a variety of plants and animals including threatened and endangered species. Because of their instability, sinkholes and caves pose constraints to roadway construction. Based on GIS information for Washington, Smyth, and Wythe Counties provided by the Virginia Department of Mines, Minerals, and Energy (DMME), sinkholes are a prevalent feature near I-81 in those counties.

Based on DCR Natural Heritage GIS information, regions of karst topography in the I-81 study area that harbor cave communities (karst screening areas) are in Washington, Rockbridge, Rockingham, and Shenandoah Counties. Correspondence from the DCR notes that the Billy Williams Cave, in Rockbridge County, is an important cave within the I-81 study area. Another prominent karst feature, identified by the Virginia Cave Board, is an important cave named the Interstate 81 Cave. Most of the cave lies south of I-81 in Smyth County near Marion. The extreme downstream portion passes underneath I-81. The locations of these caves are not mapped in any figures in order to protect these resources.

Waters of the United States

Waters of the United States (WOUS) are regulated by the U.S. Army Corps of Engineers and the Virginia Department of Environmental Quality. They include wetlands and surface waters such as lakes, ponds, and streams. The I-81 study area has many stream systems, riverine environments, and small ponds. Wetlands are found to a lesser extent because of the steep topography of the region. The following sections describe WOUS within the I-81 study area.

Watersheds

Interstate 81 crosses five major watersheds as depicted in Figure 4-5 (see Chapter 8, *Figures*). Organized from largest to smallest, Table 4.8-1 summarizes key information for these five watersheds.

Table 4.8-1 Major Watersheds: I-81 Study Area

Name	Size* (mi^2)	I-81 Counties	Major Tributaries in I-81 Study Area	Characteristics
James River Basin	10,236	Augusta, Botetourt, Rockbridge	James River Maury River	Largest watershed
Roanoke River Basin	6,274	Montgomery, Roanoke	Roanoke River	Most urbanized
Potomac-Shenandoah River Basin	5,702	Augusta, Frederick, Rockingham, Shenandoah, Warren	Shenandoah River	Mostly forested/ agricultural land uses
New River Basin	3,068	Montgomery, Pulaski, Wythe	New River	High stream density
Holston River Basin	1,322	Washington, Smyth	Holston River	Smallest watershed; abundant and diverse fisheries

*Source: Virginia Department of Conservation and Recreation

Rivers and Perennial Streams

Rivers and perennial streams within the I-81 study area were identified based on available GIS data, aerial photography, and a windshield survey completed in the summer of 2004. GIS coverage of streams (hydrography) was first superimposed on 2000 aerial photography, and then stream centerlines were repositioned or added to match the photography. The windshield survey verified the location of rivers and perenial streams in the study area. In addition, intermittent streams and streams of undetermined perenniality were also located. The *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report* includes a more detailed discussion of perennial streams.

In total, approximately 200 rivers and perennial streams bisect the study area. Although the Tier 1 analysis focuses on these streams, there are approximately 80 additional intermittent streams, and streams that have not yet been determined as being either perennial or intermittent. If one or more "Build" concepts (or portions of a "Build" concept) are advanced into Tier 2, more detailed studies would be done on intermittent streams and streams of unknown perenniality since they are also regulated.

Major rivers bisecting I-81 include the James River, New River, Maury River, North Fork of the Roanoke River, and the Middle Fork of the Holston River. Most of the streams are relatively minor first and second order systems that drain farmlands, open pastures, mountain passages, and hollows. The highest frequency of stream segments (stream density) occurs in the Holston River watershed to the southwest and in the Roanoke River watershed. Because of the severe topography and the resulting drainage pattern that has many branches, the southernmost portion of the study area also contains a substantially higher linear footage of perennial stream channels than any other part of the study area. The streams into which these tributaries converge flow parallel and adjacent to the

highway for considerable distances, draining southwest toward the Holston River. The most notable of these are the Middle Fork of the Holston River and Mill Creek, which flow 6.9 miles and 3.2 miles within the southwest section of the I-81 study area, respectively. Toward the north, the Shenandoah Valley has a more simplifed drainage pattern, gentler relief, and less frequent streams, although those watersheds contain a greater number of high-order streams such as the North River and North Fork of the Shenandoah River. Table 4.8-2 summarizes stream information per watershed within the I-81 study area.

Table 4.8-2 Stream Summary by Watershed: I-81 Study Area

Watershed	Milepost	Linear Footage of Streams	Total Number of Streams	Stream Density[1]
Holston River	0 - 58	126,203	48	0.83
New River	58 - 118	89,075	24	0.40
Roanoke River	118 - 153	57,982	31	0.88
James River	153 - 208	89,396	27	0.49
Potomac-Shenandoah River	208 - 325	89,218	59	0.50

1 Number of streams per mile

Within the Roanoke River watershed, the highest stream density occurs in Roanoke County. This is due to the presence of Fort Lewis Mountain, a mountain that has a relatively dense trellis drainage system that results in a high number of streams, many of which drain toward I-81. The far western counties of Washington and Smyth (both within the Holston River watershed) also have high stream densities, with Smyth County also possessing the most linear footage of streams within the I-81 study area. Rockingham County, in the north, has one of the lowest stream densities and least linear footage of streams. Table 4.8-3 summarizes stream information per county within the I-81 study area.

Table 4.8-3 Stream Summary by County: I-81 Study Area

County	Milepost	Linear Footage of Streams	Total Number of Streams	Stream Density[1]
Washington	0 - 35	56,012	28	0.81
Smyth	35 - 58	70,191	20	0.87
Wythe	58 - 87	61,339	12	0.40
Pulaski	87 - 105	23,211	9	0.50
Montgomery	105 - 131	19,589	10	0.39
Roanoke	131 - 147	31,357	20	1.20
Botetourt	147 - 174	58,256	17	0.63
Rockbridge	174 - 206	34,272	12	0.38
Augusta	206 - 238	39,678	25	0.80
Rockingham	238 - 265	17,130	8	0.30
Shenandoah	265 - 300	23,809	15	0.42
Warren	300 - 301	0	0	0.00
Frederick	301 - 325	17,030	13	0.54

1 Number of streams per mile

Lakes and Impoundments

Claytor Lake, an artificial reservoir encompassing 4,475 acres, is the most conspicuous open-water feature near I-81. It is within the New River Valley in Pulaski County. Originally constructed as a hydroelectric project in 1939, the main body of the 21-mile long impoundment is approximately one-half to two miles south of I-81, paralleling the interstate. A finger of the lake (Peak Creek) is within the I-81 study area, and crosses I-81 near Milepost 96. Just south of the City of Radford, the New River resumes flowing within its channel roughly one mile south of I-81 at the outfall from the Claytor Lake Dam.

Carvin Cove Reservoir, north of the City of Roanoke, is just outside the I-81 study area, with Carvin Creek crossing I-81 at Interchange 147 north of the I-81/I-581 interchange.

The I-81 study area contains a large number of relatively small, open-water farm ponds associated primarily with agricultural and livestock operations. A few abandoned rock quarries functioning as deep-water ponds are also present. Open-water systems were identified using National Wetland Inventory (NWI) mapping for Wetlands with Unconsolidated Bottoms (PUB) based on the Cowardin classification system. Totaling 86 acres, these ponds are distributed uniformly along the I-81 study area, and individually range from 0.25 to 20 acres. The average size is 0.38 acres. The largest amount are found within Rockingham and Shenandoah Counties, each with approximately 11 acres of ponds. More detailed information on ponds in the study area is provided in the *Wetlands and Water Resources Technical Report*.

Wetlands

Wetlands within the I-81 study area were identified based on available GIS data, aerial photography, and a windshield survey completed in the summer of 2004. GIS coverage of NWI mapping was first superimposed on 2000 aerial photography. Wetland features were repositioned or added to match the photography. The windshield survey verified the location and general extent of wetlands in the study area. The *I-81 Improvement Study Wetlands and Water Resources Technical Report* includes more detailed information on all wetland communities.

Generally, wetland systems are relatively small within the I-81 study area and consist primarily of emergent wetlands around farm ponds, and near springs and seeps. Because they are so small, the wetlands shown in Figure 5-8 (see Chapter 8, *Figures*) are shown larger than their actual size in order to see them at the scale of the graphic. Palustrine emergent wetland systems (PEM) comprise approximately 115 acres or 71 percent of all wetlands. Scattered pockets of forested wetlands occur along floodplains or depressional areas, covering approximately 34 acres or approximately 21 percent of all wetlands. Few palustrine scrub-shrub (PSS) wetlands were observed within the I-81 study area, comprising the remaining 14 percent of wetlands. All together, these three wetland systems total approximately 162 acres and are summarized per county in Table 4.8-4 below.

During the windshield survey, the study team used best professional judgment to distinguish between wetlands of relatively low functional value (*e.g.*, small depressions in fields, maintained drainage channels) and wetlands of relatively higher functional value based on their relative floral and faunal diversity, habitat quality, maturity, uniqueness, and/or rarity. Wetlands of higher functional value, if impacted, are likely to have greater wetland mitigation requirements. Of the total 162 acres of wetlands within the I-81 study area, only 25 acres were identified as having relatively higher functional value. They primarily include emergent and scrub-shrub systems associated with springs and seeps, forested floodplains, and forested beaver ponds.

Information on the size and location of each specific wetland system is included in the *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report*.

Table 4.8-4 Wetlands by County: I-81 Study Area

County	Type of Wetland	Acres	Total Acres	County	Type of Wetland	Acres	Total Acres
Washington	PEM	2.9		Rockbridge	PEM	12.3	
	PFO	1.8			PFO	1.7	
	PSS	0			PSS	0	
			4.7				14.0
Smyth	PEM	16.3		Augusta	PEM	24.9	
	PFO	6.0			PFO	1.1	
	PSS	3.7			PSS	4.2	
			26.0				30.2
Wythe	PEM	12.4		Rockingham	PEM	5.2	
	PFO	0			PFO	2.6	
	PSS	1.8			PSS	0.7	
			14.2				8.5
Pulaski	PEM	2.6		Shenandoah	PEM	6.3	
	PFO	0.6			PFO	1.0	
	PSS	0			PSS	0.6	
			3.2				7.9
Montgomery	PEM	4.0		Warren	PEM	0	
	PFO	0.6			PFO	0	
	PSS	0			PSS	0	
			4.6				0
Roanoke	PEM	0.1		Frederick	PEM	27.0	
	PFO	0.8			PFO	11.9	
	PSS	0.1			PSS	3.1	
			1.0				42.0
Botetourt	PEM	0.7					
	PFO	5.4					
	PSS	0					
			6.1	Total Wetlands			162.4

PEM – Emergent Wetlands; PFO – Forested Wetlands; PSS – Scrub Shrub Wetlands

Groundwater

Aquifers

The majority of groundwater in the I-81 study area originates from Valley and Ridge carbonate rock aquifers. The most productive aquifers in the I-81 study area occur primarily in limestone found in valleys. Relatively porous limestone and sandstone formations in the study area yield moderate to large volumes of water.

Sole Source Aquifers

There are no sole source aquifers within the I-81 study area. Prospect Hill Spring in Clarke County is the nearest sole source aquifer, approximately 10 miles east of I-81.

Drinking Water Supplies

Groundwater is used extensively for public drinking water supplies within the I-81 study area. The majority of groundwater originates from Valley and Ridge carbonate rock aquifers. A thick sequence of carbonate rocks in the Great Valley along I-81 contains productive aquifers yielding approximately 850 gallons per minute (gpm), while shale and sandstone conglomerate rocks and thin limestone yield between 15 and 100 gpm.

According to GIS information from the Virginia Department of Health (VDH), a total of 34 public wells are within the I-81 study area (see Figure 5-8). While these wells are spread throughout much of the I-81 study area (except for Washington County which had no public wells within the study area), the highest number of wells are in Shenandoah County (a total of nine). Public wells provide water for a mix of small businesses, residential areas, rest areas, and towns along I-81, such as Buchanan, New Market, and Mount Jackson.

Rivers and lakes within the I-81 study area also provide a source of drinking water. Multiple community systems, particularly within Roanoke County, use the same surface water source for their drinking water supply. Within the I-81 study area, major sources of surface water used by community systems come from the North River, Buffalo Creek, Maury River, Roanoke River, New River, and the Middle Fork of the Holston River. In addition, two reservoirs are close to I-81: Claytor Lake and Carvin Cove Reservoir which provide drinking water to portions of Pulaski County and the City of Roanoke, respectively. Based on available GIS information, no surface water intakes are within the I-81 study area.

Several surface water protection zones intersect the I-81 study area as summarized in Table 4.8-5. The Virginia Department of Health delineates these zones as part of the Commonwealth's Source Water Assessment Program (SWAP), approved by EPA under Section 1453 of the Safe Drinking Water Act. Aimed at protecting drinking water sources, the SWAP identifies surface water protection zones and potential measures to protect the source waters.

Table 4.8-5 Surface Water Protection Areas: I-81 Study Area

County	Name of Surface Water	Milepost
Washington	South Holston Lake	19
Washington	Middle Fork Holston River	22 – 26
Smyth	Middle Fork Holston River	49 – 54
Wythe	Reed Creek	66 – 74
Pulaski	Claytor Lake	90 – 98
Pulaski/Montgomery	New River Intake	100 – 110
Montgomery	New River Raw Water Pump Station	106 – 111
Montgomery	Spring Hollow	127 – 132
Roanoke	Roanoke River	132 – 139
Shenandoah	North Fork Shenandoah River	280 – 284
Shenandoah	North Fork Shenandoah River	292 – 295
Warren/Frederick	North Fork Shenandoah River	297 – 302

Source: Virginia Department of Transportation GIS data, 2003

A variety of raw water and sewer facilities (such as treatment plants, pumps, storage facilities, and distribution lines) are found within the I-81 study area, with numerous distribution lines passing directly under the interstate, particularly at interchanges. A total of 11 raw water treatment plants, storage facilities, and pumps are within the I-81 study area, distributed among the following counties: Washington (three at Milepost 15), Smyth (Mileposts 46 and 49), Wythe (Milepost 72), Pulaski (Milepost 95), Botetourt (Milepost 167), Rockbridge (Mileposts 196 and 206), and Shenandoah (Milepost 274). In addition, the study area also includes 16 sewage treatment facilities. Additional public water supply systems, primarily additional distribution systems, are planned in Roanoke County, Washington County, Botetourt County, Smyth County, and the City of Bristol.

Water Quality

Surface Waters

Based on data collected in 2001 (DEQ, 2004a), water quality conditions are generally good for the streams within the I-81 study area in terms of chemical and biological indicators of stream health. Some of the streams within the I-81 study area exhibit signs of having water quality above the state average because of their ability to support aquatic species that are particularly sensitive to water quality (*e.g.*, trout and threatened and endangered fish and mussels).

According to Virginia Department of Environmental Quality's (DEQ's) most recent 305(b) Water Quality Assessment Report (DEQ, 2004b), water quality sampling has revealed several trends indicative of an improvement in water quality within several river basins that cross the I-81 study area.

Impaired Streams

Despite general improvements in water quality, some streams in the study area do not meet state standards for water quality. DEQ has established six categories in defining its highest water quality standards: aquatic life, fishing, shellfishing, swimming, public water supplies, and wildlife. DEQ has defined "impaired" as one or more of those categories being affected by pollution or certain natural conditions. Within the I-81 study area, 27 streams have been assigned impaired status including Peak Creek and Carvin Creek which drain into Claytor Lake and Carvin Cove Reservoir, respectively. Except for two streams, all streams are impaired as a result of high fecal coliform levels. A complete list of impaired streams, including the type of impairment, is provided in the *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report*.

Impaired streams are concentrated in the far southern and northern section of the study area. More than half of the impaired streams, a total of 15, occur within the Potomac-Shenandoah River Basin, including the North Fork of the Shenandoah River at Milepost 269. This may be the result of the effects of development and more intensive farming in the northern portion of the study area. In the western portion of the study area, six streams are listed as impaired in the Holston River Basin, including the Middle Fork of the Holston River at Milepost 35. Relatively few impaired streams are listed within the James, New, and Roanoke River Basins.

The two impaired lakes in the vicinity of I-81 are also drinking water supplies: Claytor Lake in Pulaski County and Carvin Cove in Botetourt County. Both lakes are listed as being impaired as a result of low dissolved oxygen levels.

Groundwater

In the Valley and Ridge Province, groundwater is characterized by hardness, high sulfate, manganese, acidity, and total dissolved solids. Within the study area, the presence of karst features allows runoff to enter limestone sinkholes. The pollution potential is considered high in limestone areas where groundwater moves rapidly. According to the U.S. Geological Survey report, *Aquifer Susceptibility in Virginia, 1998-2000*, water supplies developed in the regional aquifer systems of the Valley and Ridge Province are susceptible to contamination from near-surface sources (Nelms *et al.*, 2003).

There are no known critical groundwater management areas designated within the I-81 study area.

Floodplains

The Federal Emergency Management Agency (FEMA) is responsible for designating flood prone areas for safety and insurance-related issues and floodplain management. Flood Insurance Rate Maps (FIRMs) depict the extent of "Special Flood Hazard Areas," corresponding to those inundated by the 100-year floodplain. Hard copy maps and GIS floodplain data (where available) were reviewed to identify special flood hazard areas in the I-81 study area. For counties with no GIS floodplain data, major 100-year floodplains were

digitized and incorporated in the study GIS. These 100-year floodplains are most extensively found along perennial streams in the study area that both cross and parallel the interstate. Table 4.8-6 lists those rivers and streams with more expansive 100-year floodplains within the I-81 study area.

Generally, the north central portion of the I-81 study area (Shenandoah, Rockingham, Augusta, Rockbridge, Botetourt, and Roanoke Counties) has a greater concentration of streams with 100-year floodplains than either the northern or southern sections. Over half of the floodplain areas along the entire study area are associated with small streams and tributaries that either cross or parallel I-81. The 100-year floodplains adjacent to these smaller streams are relatively narrow. The remaining 100-year floodplains areas are wider and are associated with many of the larger rivers that intersect and parallel I-81 (see Table 4.8-6).

Table 4.8-6 Major 100-Year Floodplains: I-81 Study Area

River	County	Milepost	Orientation to I-81
Middle Fork Holston River	Smyth	35, 37, 47	Parallels/crosses
New River	Pulaski	105	Crosses
North Fork Roanoke River	Montgomery	128	Parallels
Tributaries of Roanoke River	Roanoke	136, 137	Crosses
Mason Creek	Roanoke	141	Crosses
Carvin Creek	Roanoke	147	Crosses
Tinker Creek	Botetourt	150 - 152	Parallels/crosses
Beckner Branch	Botetourt	161 - 162	Parallels/crosses
James River	Botetourt	165	Crosses
Purgatory Creek	Botetourt	169	Parallels
Maury River	Rockbridge	191	Crosses
South River	Augusta	209 - 212	Parallels
Lewis Creek	Augusta	226	Crosses
Middle River	Augusta	229	Crosses
North River	Augusta	240	Crosses
Blacks Run	Rockingham	242 - 243	Parallels/crosses
Dry Fork	Rockingham	251 - 253	Parallels
Smith Creek	Rockingham	257 - 258	Parallels
North Fork Shenandoah River	Shenandoah	269 - 270	Parallels/crosses

Source: GIS and paper copy FIRM data from the Federal Emergency Management Agency (various dates)

Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in October 1968 stemming from the Wild and Scenic Rivers Act. Congress declared, "that certain selected rivers of the Nation possess outstandingly remarkable scenic, recreational, geologic, fish and

wildlife, historic, cultural, or other similar values." There are no federally designated wild and scenic rivers in the I-81 study area. Three river segments, however, are on the Nationwide Rivers Inventory (NRI), a national listing of river segments potentially eligible for inclusion in the National Wild and Scenic Rivers System. These NRI segments are the James River where it crosses I-81 at Milepost 165, Narrow Passage Creek where it crosses I-81 in Shenandoah County near Milepost 282, and Cedar Creek at the Shenandoah and Frederick County line (Milepost 300).

At the state level, Virginia's Scenic Rivers Act of 1970 was passed to protect and preserve certain rivers or sections of rivers possessing natural or pastoral beauty. There are no river segments within the I-81 study area that have been formally accepted into the Virginia Scenic Rivers Program. Several stream segments, however, have been designated worthy of further study and one stream segment has qualified for acceptance but has not yet joined the program. This information is summarized in Table 4.8-7.

Table 4.8-7 Virginia's Scenic Rivers Program: I-81 Study Area

River Segment	Milepost	Designation
Middle Fork Holston River	35	Worthy of Further Study
New River, North of I-81	105	Worthy of Further Study
New River, South of I-81	105	Qualifies for Acceptance
James River	165	Worthy of Further Study
Maury River	191	Worthy of Further Study
North Fork Shenandoah River	269 - 270	Worthy of Further Study
Cedar Creek	300	Worthy of Further Study

Source: GIS data from the Virginia Department of Conservation and Recreation

Currently, bridges span all these river segments along I-81.

Wildlife and Habitat

Wildlife population densities depend on many factors including habitat and quality, cover and nutritional food supplies, predator/prey relationships, climate, and human disturbance. Wildlife habitat within the I-81 study area consists primarily of rivers and streams, wetlands, hardwood forests, fields, and pastures. A multitude of terrestrial and aquatic species inhabitat these various habitat types. Other wildlife habitat types include cold water trout streams and caves. This section briefly describes these various habitat types and their associated species.

Trout Streams

A total of 15 trout streams are within the I-81 study area, concentrated primarily in the far western and far northeastern portion of the study area. The Virginia Department of Game and Inland Fisheries (DGIF) is responsible for managing trout resources. For management

purposes, DGIF classifies stream reaches as wild trout streams (Class I to IV) or stockable trout streams (Class V and VI). Most of the trout streams in the I-81 study area are class VI trout streams. One stream, Redbud Run in Frederick County, is the only wild trout stream within the I-81 study area. Table 4.8-8 summarizes the available information on trout streams.

Table 4.8-8 Trout Streams: I-81 Study Area

River	County	Milepost	Stream Classification
Steele Creek	Washington	1	VI
Beaver Creek	Washington	6 and 8	VI
Spring Creek	Washington	13	VI
Berry Creek	Washington	19	VI
Preston Hollow	Smyth	39	VI
Laurel Spring Creek	Smyth	43	VI
Middle Fork Holston River	Smyth	45 - 55	VI
Staley Creek	Smyth	46	N/A
Folly Mills Creek	Augusta	220	VI
Smith Creek	Rockingham	257 - 258	V
Mill Creek	Shenandoah	273	N/A
Stony Creek	Shenandoah	280	V
Opequon Creek	Frederick	310	VI
Redbud Run	Frederick	318	III
Clearbrook Run	Frederick	322	VI

Source: Virginia Department of Game and Inland Fisheries GIS data, 2003

Rivers, Streams, and Lakes

Rivers, streams, and lakes provide habitat for a variety of fish, reptiles, and aquatic plants and invertebrates. The I-81 study area contains multiple fisheries habitat types varying from warm, shallow lakes and ponds, to slow-moving, meandering streams, to colder, high velocity headwater streams. Streams in higher elevations generally contain clean water kept cooler by well shaded riparian areas. These streams tend to have high gradients and cascading water that encourages high amounts of dissolved oxygen. Those containing aquatic plants, logs, boulders, and undercut banks provide areas for fish to spawn.

Approximately 166 fish species occur within the I-81 study area. Many of these species occupy both flowing waters and/or impoundments. Fisheries prevalent within the study area include rock bass (*Ambloplites repestris*), largemouth bass (*Micropeterus salmoides*), bluegill (*Lepomis macrochirus*), and three trout species – brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*) and rainbow trout (*Salmo gairdneri*). These species are most notable to the recreational and sport fisheries industry.

Rivers and streams in the I-81 study area also provide habitat for several threatened and endangered fish and mussel species. Their habitat requirements are discussed below.

Caves

Caves provide habitat primarily for bats and cave-adapted invertebrates. The most prevalent bat species within the I-81 study area are: big brown bat (*Eptesicus fuscus fuscus*), eastern red bat (*Lasiurus borealis borealis*), hoary bat (*lasiurus cinerus cinerus*), little brown bat (*Myotis lucifugus lucifugus*), and silver-haired bat (*Lasionycteris noctivagans*). Although a 1967 preliminary survey of the Interstate 81 Cave found several rare terrestrial and aquatic invertebrate species, limited scientific data concerning this cave are available, such as cave use by bats.

Vegetative Communities

Two dominant vegetative communities comprise the majority of the I-81 study area: upland hardwood deciduous forest and herbaceous fields/pastures. Not as common, shrub communities can be found in recently disturbed areas, abandoned agricultural fields/pastures, and streamside riparian zones. Wetland vegetative community types are discussed above.

Forest Cover

The upland deciduous forest cover type dominates the I-81 study area from the City of Roanoke southward through the majority of Montgomery County where agricultural activities are less prevalent in this region of steep terrain. Otherwise, forested areas occur as scattered, fragmented woodlots interspersed among wider expanses of cleared agricultural lands and residential/commercial uses for the remainder of the study area. Species composition of forested areas throughout the I-81 study area are relatively the same, with red oaks (*Quercus rubra, Q. velutina, Q. palustris, Q. coccinea*), white oaks (*Q. alba, Q. stellata, Q. prinus, Q. bicolor*), hickories (*Carya glabra, C. tomentosa, C. cordiformis*), black locust (*Robinia pseudoacacia*), yellow poplar (*Liriodendron tulipifera*), flowering dogwood (*Cornus florida*), white ash (*Fraxinus americana*), and black walnut (*Juglans nigra*) being the most common. Evergreen trees interspersed within the deciduous forests include eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), and Virginia pine (*Pinus virginiana*).

The forested habitats are important resources for arboreal mammals such as the gray squirrel, fox squirrel, southern flying squirrel, and bats. Other mammals reliant upon forested habitats include the gray fox, eastern chipmunk, certain species of mice (deer mouse and white-footed mouse), eastern woodrat, voles, black bear, white-tailed deer, and striped skunk. Forested habitats are also important resources for a variety of passarine birds (Northern cardinal, chickadees, warblers, and vireos), woodpeckers, birds of prey (owls and hawks), crows, wild turkeys, and certain reptiles (black rat snake, eastern box turtle, and northern copperhead snake).

Pastures and Fields

Pastures, roadside fields, and meadows are more prevalent in the northern half of the study area where the interstate bisects the lower elevations of the Shenandoah Valley. These habitat types are primarily associated with cattle foraging areas and hay production. Dominant plants include fescue grass (*Festuca* spp.), thistle (*Carduus* spp.), black-eyed Susan (*Rudbeckia heliopsidis*), blackberry (*Rubus* spp.), goldenrod (*Solidago* spp.), sheep-sorrel (*Rumex acetosella*), plantain (*Plantago* spp.), broome straw (*Andropogon* spp.), and vetch (*Vicia* spp.). These early successional habitats are preferred by a variety of species such as the eastern cottontail rabbit, oldfield mouse, red fox, moles, horned lark, eastern meadowlark, swallows, eastern bluebird, a number of sparrows, and the eastern black rat snake.

Shrub Habitat

Infrequently occuring shrub communities can be found in recently disturbed areas, abandoned agricultural fields/pastures, and along forest borders and streamside riparian zones. Some of the most common vegetative species include hawthorn (*Crataegus* spp.), blackberry (*Rubus* spp.), dense honeysuckle (*Lonicera japonica*), Autumn olive (*Elaeagnus umbellata*), winged sumac (*Rhus copallinum*), wild rose (*Rosa* spp.), and tree saplings. Shrub communities are used by a number of wildlife species primarily because of the protective cover they provide for foraging, denning, nesting, and roosting animals. Some of the most common wildlife species found using shrub habitats include the groundhog, eastern cottontail rabbit, bobcat, long-tailed weasel, chipmunk, winter wren, rufous-sided towhee, finches, and sparrows.

Threatened and Endangered Species

The potential presence of federal- and state-listed threatened and endangered species, natural heritage sites that contain listed species, and designated and proposed critical habitat, was determined using GIS data compiled by the Virginia Department of Game and Inland Fisheries (DGIF) and the Virginia Department of Conservation and Recreation – Division of Natural Heritage (DNH).

Federal- and State-listed Species

Table 4.8-9 summarizes the federal- and state-listed endangered, threatened, and candidate species that are previously documented within the I-81 study area. Based on available information, there are no formally designated or proposed critical habitats within the I-81 study area.

Table 4.8-9 Threatened and Endangered Species: I-81 Study Area

Organism Type	Common Name	Scientific Name (Genus species, subspecies)	Federal Status	State Status
Fish	Roanoke logperch	*Percina rex*	Endangered	Endangered
Mammal	Gray bat	*Myotis grisescens*	Endangered	Endangered
Mammal	Indiana bat*	*Myotis sodalis*	Endangered	Endangered
Mollusk	James spiny mussel	*Pleurobema collina*	Endangered	Endangered
Mollusk	Little-wing pearly mussel	*Pegias fabula*	Endangered	Endangered
Mollusk	Tan riffleshell mussel	*Epioblasma florentina walkeri*	Endangered	Endangered
Invertebrate	Virginia coil	*Polygyriscus virginianus*	Endangered	Endangered
Plant	Shale barren rock cress	*Arabis serotina*	Endangered	Not listed
Plant	Smooth coneflower	*Echinacea laevigata*	Endangered	Not listed
Mollusk	Tennessee heelsplitter mussel	*Lasmigona holstonia*	SOC	Endangered
Mollusk	Brook floater mussel	*Alasmidonta varicosa*	SOC	Endangered
Invertebrate	Shaggy coil snail	*Helicodiscus diadema*	SOC	Endangered
Fish	Tennessee dace*	*Phoxinus tennesseensis*	SOC	Endangered
Mollusk	Slabside pearly mussel	*Lexingtonia dolabelloides*	Candidate	Threatened
Fish	Orangefin madtom	*Noturus gilberti*	SOC	Threatened
Bird	Loggerhead shrike	*Lanius ludovicianus ludovicianus*	Not listed	Threatened
Reptile	Wood turtle	*Clemmys insculpta*	Not listed	Threatened

SOC – Species of Concern; Candidate – Candidate Species

* Species not documented within the I-81 study area, but potential habitat may be present (see Table 4.8-11).
Sources: GIS data from DGIF, and Virginia Department of Conservation and Recreation – Natural Heritage Division

Table 4.8-10 lists the stream reaches within the I-81 study area that are known to contain threatened and endangered aquatic species using based on Threatened and Endangered Waters GIS data from DGIF. DGIF created the database from "Outstanding State Resource Waters" data (1994), threatened and endangered species point coverage (DGIF, 2002), and hydrography data layers (USEPA Reach Files, v. 3) (DGIF, 2002). Information on the specific species found in these streams or their exact location are not provided in the database and therefore are not listed below.

Table 4.8-10 Streams with Threatened and Endangered Aquatic Species: I-81 Study Area

Stream Name	Watershed
Cedar Creek	Potomac-Shenandoah River
Holston River, Middle Fork 1	Holston River
Holston River, Middle Fork 2	Holston River
Roanoke River, North Fork	Roanoke River
Smith Creek	Potomac-Shenandoah River
Tinker Creek	Roanoke

Source: Virginia Department of Game and Inland Fisheries GIS data, 2002

Natural Area Preserves

The Virginia Natural Area Preserve System was established by law in 1989 to protect and conserve natural heritage areas in accordance with the Code of Virginia sections 10.1-209 to 217. Lands formally designated as a natural area preserve are afforded protection against most forms of condemnation and conversion to other land uses. One natural area preserve, Pedlar Hills, is within the I-81 study area in Montgomery County, near Milepost 128.

Natural Heritage Sites

The DNH also maintains information on natural heritage sites in Virginia including conservation sites and stream conservation units. Although the sites themselves are not afforded legal protection, they are a useful tool for identifying natural heritage resources, including the habitat of threatened and endangered species. Natural heritage resources are defined as "the habitat of rare, threatened, and endangered plant and animal species; exemplary natural communities, habitats, and ecosystems; and other natural features of the Commonwealth."[1] Table 4.8-11 lists natural heritage sites that contain state and federally listed species, based on available GIS information.

The I-81 study area contains a number of natural heritage sites that are listed in Table 4.8-11. They are distributed along most of the study area but particularly concentrated in Smyth and Montgomery Counties.

Table 4.8-11 Natural Heritage Sites with Federal- and/or State-listed Species: I-81 Study Area

Site Name	Milepost	County
Little Rock Glade	130	Montgomery
Elliston Glades	129	Montgomery
Middle Fork Holston River-Sulphur Spring Creek SCU	36-37	Smyth
Middle Fork Holston River-Bear Creek SCU	47-53	Smyth
Chilhowie Habitat Zone	35	Smyth
North Fork Shenandoah River-Seven Bends SCU	287	Shenandoah
Unnamed site	250-257	Rockingham
Unnamed site	266-273	Shenandoah
Unnamed site	128	Montgomery
Unnamed site	130	Montgomery
Unnamed site	167	Botetourt
Unnamed site	266	Shenandoah

SCU – Stream Conservation Unit

[1] Virginia Natural Area Preserves Act of 1989 (Section 10.1-209 through 217, Code of Virginia)

4.8.2 Rail Study Area

Geology

The geologic conditions in the rail study area are briefly summarized below.

Physiography and Topography

Adjacent to the I-81 study area, the Shenandoah rail line also lies within the Valley and Ridge physiographic province. Located in the southwestern portion of Virginia, the Shenandoah rail improvement sections are in relatively steep terrain, with several stream crossings and limited wetland systems. The Piedmont rail line, east of I-81, is primarily in the Piedmont physiographic province, an area with broad rolling hills and deeply weathered bedrock. A transitional area between the Valley and Ridge Province and Virginia's flat Coastal Plain, topography in the Piedmont is gently rolling with lower elevations. The flatter topography results in larger and more frequent wetland systems.

Karst Topography

Similar to I-81, the Shenandoah rail line traverses areas where karst topography is prevalent. As a result, sinkholes and caves are prominent features in the Shenandoah portion of the rail study area. DCR Natural Heritage GIS information indictes the presence of karst screening areas (regions of karst topography that harbor cave communities and natural heritage sites) within the rail section at the Wythe/Pulaski County line. For those rail improvement sections along the Piedmont line, karst features are present mostly in Clarke and Warren Counties. The study area for the rail improvement section at the Clarke/Warren County line also includes a karst screening area.

Waters of the United States

Both the Piedmont and Shenandoah rail improvement sections have many stream systems, riverine environments, wetlands and small impoundments. The following sections describe WOUS within the rail study area.

Watersheds

Table 4.8-12 lists the watersheds and major tributaries associated with the rail study area. The 13 rail improvement sections cross four of the same major watersheds that I-81 crosses: the Roanoke River Basin, Potomac-Shenandoah River Basin, New River Basin, and Holston River Basin. These watersheds are depicted in Figure 4-5 (see Chapter 8, *Figures*).

Table 4.8-12 Major Watersheds: Rail Study Area

Name	Size* (mi^2)	Rail Line and Section Number	Counties	Major Tributaries Near Rail Section	Characteristics
Holston River Basin	1,322	Shenandoah Line Sections 1, 2	Smyth, Washington	Middle Fork Holston River	Smallest watershed in rail study area/ abundant and diverse fisheries
New River Basin	3,068	Shenandoah Line Sections 3, 4	Pulaski, Wythe	South Fork Reed Creek, Peak Creek	High stream density
Potomac-Shenandoah River Basin	5,702	Piedmont Line Sections 5, 6, 7, 8, 9, 10, 11, 12	Clarke, Fauquier, Prince William, Warren	South Fork Shenandoah, North Fork Shenandoah, Broad Run	Mostly forested/ agricultural land uses
Roanoke River Basin	6,274	Piedmont Line Section 13	Pittsylvania	Banister River	Most urbanized

*Source: Virginia Department of Conservation and Recreation

Rivers and Perennial Streams

Many small stream features bisect the rail study area as illustrated in Table 4.8-13. In addition, two rail improvement sections cross major perennial streams, the Middle Fork of the Holston River in Smyth County and the Banister River in Pittsylvania County. No streams are within the Prince William County rail improvement section. In total, approximately 30 perennial streams bisect the rail study area. The *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report* includes a more detailed discussion of perennial streams.

Over 30 rivers and streams are within the rail study area. The highest frequency of stream segments (stream density) occurs in the Holston River watershed, along the Shenandoah rail sections. The Piedmont rail line improvement sections contain the highest linear footage of streams in the rail study area mainly because of the relatively long lengths of the rail sections in those counties. Many of the streams in this watershed parallel those rail sections. Most notably are Goose Creek for 2.9 miles and Broad Run for 1.2 miles. The Pittsylvania County section (rail section 13) is the longest rail improvement section, traveling almost 10 miles. As a result, it also crosses a large number of streams.

Table 4.8-13 Stream Summary by Watershed: Rail Study Area

Watershed	Rail Line and Section Number	County	Linear Footage of Streams	Total Number of Streams	Stream Density*
Holston River	Shenandoah Line Sections 1, 2	Washington, Smyth	6,959	6	3.1
New River	Shenandoah Line Sections 3, 4	Pulaski, Wythe	9,791	4	1.8
Potomac-Shenandoah River	Piedmont Line Sections 5, 6, 7, 8, 9, 10, 11, 12	Clarke, Warren, Fauquier, Prince William	37,633	13	0.7
Roanoke River	Piedmont Line Section 13	Pittsylvania	30,511	11	1.1

*Number of streams per mile

Lakes and Impoundments

No lakes are found within the rail improvement sections. The rail study area does contain several open water ponds including stormwater management ponds, farm ponds with a minimal or non-existent fringe of hydrophytic vegetation, and ponds associated with water treatment facilities. These total approximately 24 acres. The majority of these, over 17 acres, are located in the Piedmont line sections from Front Royal to Manassas (rail sections 9, 10, 11, and 12).

Wetlands

Jurisdictional wetlands in the rail study area were identified based on a combination of available resource mapping and a windshield survey completed in the summer/fall of 2004. During the windshield survey, wetlands of relatively high functional value were identifed based on their relative floral and faunal diversity, habitat quality, maturity, uniqueness, and/or rarity. The *I-81 Corridor Improvement Study Wetlands and Water Resources Technical Report* includes more detailed information on all wetland communities.

Approximately 178 acres of wetlands are in the rail study area (see Figure 5-9), primarily along the Piedmont rail line sections between Front Royal and Manassas. Of the total, approximately 92 acres, or roughly 50 percent, are emergent wetland systems (PEM). The next most common wetlands are forested wetlands (PFO), with a total of 68 acres. Scrub-shrub wetlands are the least commom within the rail study area, comprising approximately one-eighth of the total wetland amount. Table 4.8-14 shows the location and type of wetlands within the rail study area.

Table 4.8-14 Wetlands by Rail Section: Rail Study Area

Rail Section - County	Type of Wetland	Acres	Total Acres	Rail Section - County	Type of Wetland	Acres	Total Acres
1 - Washington	PEM	0		8 - Warren/ Fauquier	PEM	1.3	
	PFO	0			PFO	1.2	
	PSS	0			PSS	5.9	
			0				8.4
2 - Smyth	PEM	0		9 - Fauquier	PEM	35.4	
	PFO	0			PFO	13.1	
	PSS	0			PSS	0	
			0				48.5
3 - Wythe	PEM	8.1		10 - Fauquier	PEM	21.5	
	PFO	0			PFO	2.0	
	PSS	0			PSS	0	
			8.1				23.5
4 - Wythe/Pulaski	PEM	0		11 - Fauquier/ Prince William	PEM	16.4	
	PFO	0			PFO	23.0	
	PSS	0			PSS	10.9	
			0				50.3
5 - Clarke	PEM	3.7		12 - Prince William	PEM	0.8	
	PFO	0			PFO	24.9	
	PSS	0			PSS	0	
			3.7				25.7
6 - Warren	PEM	3.2		13 - Pittsylvania	PEM	1.7	
	PFO	0			PFO	4.1	
	PSS	0			PSS	0.4	
			3.2				6.2
7 - Warren	PEM	0					
	PFO	0					
	PSS	0					
			0	Total Wetlands			177.6

PEM – Emergent Wetlands; PFO – Forested Wetlands; PSS – Scrub Shrub Wetlands

Almost all of the wetlands described above are also considered to have relatively high functional value based on their habitat quality, maturity, and relative size. Those functions/values considered included sedimentation/erosion control, water quality, flood-flow attenuation (storage), wildlife habitat, rarity, and uniqueness. Such wetlands primarily include emergent and scrub-shrub systems associated with streams, forested floodplains, and wetland systems greater than 1.5 acres.

Groundwater

Aquifers

The Piedmont rail improvement sections are underlain primarily by crystalline rock aquifers of the Piedmont Physiographic Province. These aquifers are composed of nearly impermeable gneiss and schist, as well as metamorphosed igneous materials originating from volcanic ash and lava flows. Groundwater in these aquifers moves slowly through fractures, as these types of bedrock are not easily weathered.

The Shenandoah rail improvement sections are underlain by Valley and Ridge Province carbonate rock aquifers as well as some areas of undifferentiated sedimentary rock aquifers. The most productive aquifers in the Valley and Ridge Province are primarily composed of limestone and found in valleys. Relatively porous limestone and sandstone formations in the Valley and Ridge yield moderate to large volumes of water (Trapp and Horn, 1997).

Sole Source Aquifers

There are no sole source aquifers within the rail study area. Prospect Hill Spring in Clarke County is the nearest sole source aquifer, approximately three miles southwest of rail section 5 in northern Clarke County.

Drinking Water Supplies

According to GIS information from VDH, no public wells or surface water intakes are within the rail study area. The only surface water used as a public water supply is the Middle Fork of the Holston River in Smyth County.

Two surface water protection zones intersect the rail study area as summarized in Table 4.8-15.

Table 4.8-15 Surface Water Protection Areas: Rail Study Area

Name of Surface Water	Rail Line	Rail Section	County
Peak Creek	Shenandoah	4	Pulaski/Wythe
Shenandoah River	Piedmont	5	Clarke

Source: Virginia Department of Transportation GIS data, 2003

There are two sewer facilities located within the rail study area. Both are pump stations in the northern improvement sections of the Piedmont rail line; one is located in the Town of Berryville in Clarke County (rail section 5), and the second is located in the Town of Front Royal in Warren County on rail improvement section 6. Likewise, sewer distribution lines pass through the Piedmont line rail improvement section in Clarke County (5), and the Shenandoah line rail improvement section in Smyth County (2). Several rail improvement sections include water distribution lines either paralleling the rail line or crossing it (or both):

- Rail Improvement Section 1: Washington County Service Authority water line
- Rail Improvement Section 2: Town of Marion water line
- Rail Improvement Section 5: Town of Berryville water line
- Rail Improvement Section 6: Town of Front Royal water line
- Rail Improvement Section 13: Town of Chatham water line

Water Quality

Impaired Streams

Within the rail study area, eight streams have been assigned impaired status. Three impaired streams occur in the Potomac-Shenandoah River Basin within the rail improvement sections along the Piedmont line in northern Virginia: Broad Run, Goose Creek, and Happy Creek. One impaired stream occurs within the Roanoke River Basin within the Pittsylvania County rail improvement section: Cherrystone Creek. Two rail improvement sections along the Shenandoah rail line have streams assigned impaired status: Middle Fork of the Holston River intersecting the Smyth County rail improvement section and Hall Creek intersecting the Washington County rail improvement section. All streams are impaired as a result of high fecal coliform levels. In addition to elevated fecal coliform, Cherrystone Creek is also impaired as a result of low levels of dissolved oxygen (DEQ, 2004c).

Groundwater

In the Piedmont Physiographic Province, the groundwater quality is generally suitable for drinking water supplies; however, there are isolated areas with high concentrations of iron, manganese, and sulfate. The water is soft and slightly acidic (Trapp and Horn, 1997). Rail improvement sections in the Valley and Ridge Province are expected to have similar groundwater conditions as those found along I-81. There are no known critical groundwater management areas designated within the rail study area.

Floodplains

Hard copy maps and GIS floodplain data (where available) were reviewed to identify special flood hazard areas in the rail study area. These 100-year floodplains are most extensively found along larger perennial streams such as the Banister River, Shenandoah River, and the Middle Fork of the Holston River. Near the Town of Marion in Smyth County, the large floodplain associated with the Middle Fork of the Holston River intersects the rail improvement section immediately north of I-81. Several rail improvement sections along the Piedmont rail line from Front Royal to Manassas are within large 100-year floodplains including the section at the Warren County/Fauquier County line adjacent to Goose Creek. The rail improvement section at the Riverton Junction (section 7) in Warren County is at the confluence of two large perennial streams – the North Fork of the Shenandoah River and the South Fork of the Shenandoah River. A major 100-year floodplain is found in this area. North

of the City of Danville, in Pittsylvania County, the rail improvement section is also within a large floodplain area associated with the Banister River and White Oak Creek. One rail improvement section, in central Fauquier County, is located almost entirely within the 100-year floodplain of Goose Creek. Table 4.8-16 lists those rivers and streams with 100-year floodplains within the rail study area.

Table 4.8-16 100-Year Floodplains: Rail Study Area

River	County	Rail Section	Orientation to Rail
Middle Fork Holston River	Smyth	2	Parallels/crosses
Tributary of South Fork of Reed Creek	Wythe	3	Parallels
South Fork Shenandoah River	Warren	7	Parallels
Happy Creek	Warren	7	Parallels
Tributary of Shenandoah River	Warren/Fauquier	8	Parallels
Goose Creek	Warren/Fauquier	8	Parallels
Goose Creek	Fauquier	9	Parallels
Broad Run	Fauquier	10	Parallels/crosses
Broad Run	Fauquier/Prince William	11	Crosses
Catletts Branch	Fauquier/Prince William	11	Crosses
Cherrystone Creek	Pittsylvania	13	Crosses
Banister River	Pittsylvania	13	Crosses
White Oak Creek	Pittsylvania	13	Parallels/Crosses

Source: GIS and paper copy FIRM data from the Federal Emergency Management Agency (various dates)

Wild and Scenic Rivers

There are no federally designated wild and scenic rivers in the rail study area. Also, there are no river segments within the rail study area that have been formally accepted into the Virginia Scenic Rivers Program. One segment, Goose Creek, has been designated "worthy of further study". Goose Creek, in Fauquier County, is within one of the rail improvement sections along the Piedmont rail line between Front Royal and Manassas in northern Virginia.

Wildlife and Habitat

Available habitat within the rail study area is very similar to habitat provided along I-81. Wildlife habitat within the rail study area consists primarily of rivers and streams, wetlands, hardwood forests, fields, and pastures. A multitude of terrestrial and aquatic species inhabit these various habitat types as well as cold water trout streams and caves.

Trout Streams

Only one trout stream is within the rail study area. Between I-81 and the rail improvement section in Smyth County, the Middle Fork of the Holston River is a Class VI stockable trout stream.

Rivers and Streams

Rivers and streams provide habitat for a variety of fish, reptiles, and aquatic plants and invertebrates. Located in less mountaineous terrain, most of the streams in the rail study area are slow-moving streams with the exception of the Middle Fork of the Holston River noted above. Therefore, prevalent fisheries within the rail study include rock bass (*Ambloplites repestris*), largemouth bass (*Micropeterus salmoides*), and bluegill (*Lepomis macrochirus*).

Caves

Also found in the rail study area, caves provide habitat for a variety of bats and invertebrates adapted to cave habitats. The most prevalent bat species within the rail study area include big brown bat (*Eptesicus fuscus fuscus*), eastern red bat (*Lasiurus borealis borealis*), hoary bat (*lasiurus cinerus cinerus*), little brown bat (*Myotis lucifugus lucifugus*), and silver-haired bat (*Lasionycteris noctivagans*).

Vegetative Communities

Similar to the I-81 study area, the two dominant vegetative communities in the rail study area consist of upland hardwood deciduous forest and herbaceous fields/pasture. Shrub habitat occurs less frequently in recently distrubed areas, abandoned fields, and along forest borders and streams. Wetland community types and wildlife are discussed above.

Threatened and Endangered Species

Federal- and State-listed Species

Using GIS information provided by DGIF (based on DGIF's Fish and Wildlife Information Information System's COLLECTIONS database), no previously documented federal- and state-listed endangered, threatened, and candidate species are within the rail study area.

Other databases, however, indicate that state- and/or federally-protected species may be within some areas as described below.

The Middle Fork of the Holston River, which crosses rail improvement section 2 in Smyth County, is listed within a database (Threatened and Endangered Waters) created by DGIF that delineates stream reaches containing federal and state threatened or endangered aquatic species. DGIF created the database from several sources including "Outstanding State Resource Waters" data (1994), threatened and endangered species point coverage (DGIF, 2002), and hydrography data layers (USEPA Reach Files, v. 3) (DGIF, 2002). Information on the specific species found in these streams or their exact location are not provided in the database.

Based on available information, there are no formally designated or proposed critical habitats within the rail study area.

Natural Heritage Sites

Table 4.8-17 lists natural heritage sites within the rail study area that contain state and federally listed species, based on available GIS information.

Table 4.8-17 Natural Heritage Sites with Federal- and/or State-listed Species: Rail Study Area

Site Name	Rail Section/ County
Middle Fork Holston River – Bear Creek SCU	Section 2/ Smyth
Crooked Run	Section 6/ Clarke/Warren
Unknown	Section 7/ Warren

SCU – Stream Conservation Unit

4.9 Air Quality

The 1990 Clean Air Act Amendments (CAAA) resulted in states being divided into attainment and nonattainment areas with classifications based upon the severity of their air quality problem. A nonattainment area is an area that has had measured pollutant levels that exceed the National Ambient Air Quality Standards (NAAQS) and that has not been redesignated to attainment. The U.S. Environmental Protection Agency (EPA) has established six classifications of nonattainment (Extreme, Severe, Serious, Moderate, Marginal, and Other) that vary based upon their measured pollutant levels. The CAAA established emission reduction requirements that vary by an area's classification. This section describes the air pollutants that are considered when determining air quality attainment, and the existing attainment status for the I-81 and rail study areas.

4.9.1 Pollutants

EPA has established NAAQS that set limits on air pollutants considered harmful to public health. The Commonwealth of Virginia has adopted the same standards as those set by EPA. The predominant sources of air pollution are emissions of volatile organic compounds (VOCs), oxides of nitrogen (NOx), particulate matter (PM2.5), and carbon monoxide (CO).

Volatile organic compounds and NOx are important pollutants because of their role in forming ozone, which is also referred to as photochemical smog. Both of these pollutants are emitted from transportation sources. Particulate matter is a term referring to particles found in the air. EPA has promulgated a new standard (PM2.5) to limit the allowable concentration of particulate matter particles smaller than 2.5 micrometers (less than one-seventh the average width of a human hair). Emissions from highway and non-road vehicles, such as locomotives, compose approximately 28 percent of total PM2.5 emissions.[1] The largest direct source of PM is fugitive dust from paved and unpaved roads, agricultural and forestry activities, wind erosion, wildfires, and managed burning. Carbon monoxide is a product of incomplete combustion. Over 95 percent of CO emissions come from mobile sources.

4.9.2 I-81 Study Area

The air quality attainment status was identified for each of the counties through which I-81 passes: Washington, Smyth, Wythe, Pulaski, Montgomery, Roanoke, Botetourt, Rockbridge, Augusta, Rockingham, Shenandoah, Warren, and Frederick Counties. The following section describes the attainment status of areas within these counties.

[1] Environmental Protection Agency, *National Air Quality and Emissions Trends Report, 1999*, March 2001.

Ozone

An area is in nonattainment for ozone if the average of the fourth-highest monitored 8-hour ozone concentrations for each of the previous three years is at 0.085 parts per million or greater. When EPA made its 8-hour designations, Botetourt, Roanoke, and Frederick Counties were in violation of the 8-hour NAAQS standard for ozone. The most recent monitoring data, however, indicate that for Roanoke and Frederick Counties, emissions levels are below the 8-hour ozone standard (see Table 4.9-1).

Table 4.9-1 Ozone Data (8-hour Averages) (2002 through 2004)

	Fourth Highest Daily Maximum Emissions, ppb			
Monitoring Sites	2002	2003	2004	3-Year Average
Roanoke County	91	77	71	79
Frederick County	91	79	66	78

ppb – parts per billion

Botetourt, Roanoke, and Frederick Counties, whose emissions are close to or exceed the 8-hour NAAQS standard for ozone, have elected to be included in Early Action Compact areas (EACs). EACs are agreements by the localities, Virginia Department of Environmental Quality (DEQ), and EPA to develop ozone early action plans to reduce ozone precursor pollutants and improve air quality proactively and ahead of schedule. In return, these areas receive a deferment in official nonattainment area designations and related requirements. The following describes the status of the counties through which the I-81 corridor passes:

- Botetourt and Roanoke Counties are currently in violation of the 8-hour ozone standard and have entered into the Roanoke Early Action Compact;
- Frederick County is currently in violation of the 8-hour ozone standard and has entered into the Northern Shenandoah Valley Early Action Compact; and
- The remaining counties along the I-81 corridor are in attainment for the 8-hour ozone standard.

The Roanoke Early Action Plan (EAP) includes local, state, and federal emission reduction strategies. Local emission reduction strategies include heavy duty diesel standards and diesel equipment strategies; air quality action day, public education, and stationary source strategies; and lawn and garden equipment strategies. State emission reduction strategies include a Regional Ozone Transport Control Program (*i.e.*, the NOx SIP Call), a National Low Emission Vehicle Program, Reasonably Available Control Technology controls for existing industries, an enhanced ozone forecasting tool for the Roanoke area, and Stage I vapor recovery at service stations. Finally, federal emission reduction strategies include stationary and area source controls, motor vehicle controls, non-road vehicle and equipment standards, and Tier 2 Emission and Fuel Controls.

Frederick County has also developed an EAP. The federal and state emission reduction strategies for Frederick County are the same as for the Roanoke EAP, except they do not include Stage I Vapor Recovery at service stations. Local emission reduction strategies include restrictions on open burning and engine idling, school bus retrofits, voluntary industrial reductions, vehicle miles of travel (VMT) reduction programs, and ozone action days/public awareness.

Carbon Monoxide

All counties within the I-81 study area are in attainment for CO.

Particulate Matter

On December 17, 2004, EPA took final action on its PM2.5 designations. Based on the new designations, all counties within the I-81 study area are in attainment for PM2.5. Recent monitoring data indicate that all the counties experience values that are substantially below the 24-hour NAAQS of 65 micrograms per cubic meter.

However, the monitoring data also indicate that Salem and Roanoke Counties approach the PM2.5 annual arithmetic mean NAAQS of 15 micrograms per cubic meter. Table 4.9-2 shows the 2002 through 2004 annual arithmetic mean for monitoring sites within these counties.

Table 4.9-2 PM2.5 Data (Annual Arithmetic Means) (2002 through 2004)

	Emissions, mg/m^3			
Monitoring Sites	2002	2003	2004	3-Year Average
Southwest Virginia Area:				
Bristol	14.1	13.8	13.9	13.9
Roanoke/Lynchburg Area:				
Roanoke	14.4	13.5	13.5	13.8
Salem	15.1	13.8	14.3	14.4

mg/m^3 – micrograms per cubic meter

Visibility

In 1999, the EPA issued regulations to improve visibility by reducing haze in 156 national parks and wilderness areas across the country, including the Shenandoah National Park, which have been classified as Class I areas. Shenandoah National Park is roughly parallel to I-81, between Waynesboro and Front Royal, approximately 10 to 20 miles east of the highway. Some haze-causing pollutants are caused by truck and automobile emissions, such as nitrogen oxides.

Under the EPA haze regulations, states must establish goals to improve visibility in Class I areas and develop long-term strategies to reduce the emissions of air pollutants that cause visibility impairment. States implement their individual regional haze programs through revisions to their state implementation plans (SIP). As discussed in Section 5.10.4, *Air Quality Conformity*, if one or more of the "Build" concepts (or portions of a "Build" concept) are advanced to Tier 2, a detailed air quality analysis would be conducted. Any individual projects would have to conform to the SIP before they could be implemented.

4.9.3 Rail Corridor

The air quality attainment status was identified for each county along the sections of the Shenandoah and Piedmont rail lines that comprise Rail Concept 3. The Shenandoah rail portion passes through Washington, Smyth, Wythe, Pulaski, Roanoke, and Bedford Counties. All these counties, except Bedford, overlap with the I-81 corridor. The Piedmont rail portion of Rail Concept 3 passes through 11 counties: Campbell, Amherst, Nelson, Albemarle, Orange, Culpeper, Clark, Fauquier, Prince William, Warren, and Clarke Counties. Located east of I-81, only Warren County overlaps with the I-81 corridor.

Ozone

Roanoke County is currently in violation of the 8-hour ozone standard and has been included in the Roanoke EAC. All the remaining counties along the sections of the Shenandoah and Piedmont rail lines that comprise the rail study area are in attainment for ozone. Table 4.9-1 presents the 8-hour ozone monitoring data for the rail corridor.

Carbon Monoxide

All counties along the Shenandoah and Piedmont rail study area are in attainment for carbon monoxide.

Particulate Matter

Prince William County is the only county in the rail study area designated as being in nonattainment for PM2.5. All other counties in the rail study area are in attainment for PM2.5.

4.10 Noise

The effects of highway traffic noise are evaluated based on criteria established by the Federal Highway Administration (FHWA) in Title 23 of the Code of Federal Regulations, Part 772 (23 CFR 772), and in VDOT's State Noise Abatement Policy, dated January 1997. Federal Railroad Administration (FRA) rail noise criteria are available only for high speed trains (*i.e.*, trains with speeds greater than 125 miles per hour). These criteria are not reflective of the typical speeds of freight trains along the Piedmont and Shenandoah rail lines. The effects of rail noise were, therefore, evaluated based on criteria established by the Federal Transit Administration (FTA).

4.10.1 Noise Fundamentals

Noise is often described as unwanted sound. In this section, the terms *noise* and *sound* will be used interchangeably. Sound is the result of rapid variations of sound pressure above and below atmospheric pressure. Sound pressures are described in terms of decibels and are denoted as dB. When sound pressure levels are measured, a filter called the A-weighting network is used to reduce the magnitude of low and very high frequency sounds, much like the human ear. Sound pressure levels are reported in terms of an A-weighted sound level and are expressed in dBA. The A-weighted rating of noise sources corresponds to the human ear's reduced sensitivity to low frequency sound and correlates well with human perceptions of the annoying aspects of sound.

Highway Traffic Noise

Moving traffic produces sound levels that vary as vehicles approach and then pass by an observer. The easiest way to quantify the changing sound is to measure or calculate an average sound level over some period of time. This single-number representation of a variable sound level is called the *equivalent sound level* (L_{eq}) and contains the same amount of sound energy as the varying sound level measured over a specified time period. FHWA's and VDOT's impact criteria are in L_{eq}. For the highway analysis, the loudest hourly L_{eq} is reported.

Rail Noise

Rail noise is typically quantified as *Hourly Equivalent Sound Levels* ($L_{eq}[h]$) *and Day-Night Average Sound Levels* (L_{dn}). The $L_{eq}(h)$ describes a receiver's cumulative noise exposure from all events over a one-hour period. The L_{dn} describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 PM and 7:00 AM increased by 10 decibels to account for greater nighttime sensitivity to noise. The FTA's impact criteria are in L_{eq} and L_{dn}.

Noise Impact Criteria

Noise impact criteria vary between highway and rail projects; however, both are based on the activity reserved for the land use. The FHWA- and FTA-categorized sensitive land uses can be seen in Table 4.10-1 and Table 4.10-2, respectively.

Table 4.10-1 Highway Noise Abatement Criteria (NAC), Hourly A-Weighted Sound Level in Decibels (dBA)*

Land Use Category	$L_{eq}(h)$[1]	$L_{10}(h)$[1]	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above
D	--	--	Undeveloped lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

* Either $L_{eq}(h)$ or $L_{10}(h)$ (but not both) may be used on a project. $L_{10}(h)$ is defined as the A-weighted sound level exceeded for 10 percent of the hour.
1 These sound levels are only to be used to determine where there is a noise impact.

Table 4.10-2 Transit Noise Impact Criteria - Land Use Categories and Metrics Requiring Abatement

Land Use Category	Noise Metric[1] (dBA)	Description of Activity Category
1	Outdoor $L_{eq}(h)$*	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, including such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)$*	Institutional land uses with primarily daytime and evening use. This category include schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category, as do places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

* Leq for the noisiest hour of transit related activity during hours of noise sensitivity.
1 Impact from transit sources varies according to the existing noise level and the predicted project noise level, and is discussed in Chapter 5, *Environmental Consequences*.

4.10.2 I-81 Study Area

Land uses within the I-81 study area fall under Land Use Category A or B, as defined in Table 4.10-1. For this Tier 1 analysis, interior noise levels (Land Use Category E) are not considered. VDOT noise abatement policy states that undeveloped lands (Land Use Category D) will be treated as developed lands if and only if a proposed land use development plan has been approved by the local jurisdiction before the date of the approval of the project alignment by the Commonwealth Transportation Board (VDOT, 1997). For this analysis, undeveloped lands have been classified into the appropriate Land Use Category. Because all land uses in the study corridor were classified into either Land Use Category A or B, Land Use Category C was not considered.

For purposes of this study, all historic properties were considered to be sensitive receptors. If one or more "Build" concepts (or portion of a "Build" concept) are advanced into Tier 2, some historic properties may be determined not to be sensitive receptors because the characteristics that make them historic (such as a resource that is considered historic solely for architectural features) may not be noise sensitive.

4.10.3 Rail Study Area

The rail study area for noise encompassed the entire length of the Piedmont and Shenandoah rail lines in Virginia because an increase in trains as a result of rail improvements, as described for Rail Concept 3, would potentially affect noise levels the entire distance.

The rail study area is well populated and contains all three noise sensitive land uses described in Table 4.10-2. Since the rail study area overlaps with the I-81 study area in some locations, several noise receptors in the rail study area are also within the I-81 study area.

4.11 Hazardous Materials

Hazardous waste sites were inventoried for the study areas based on available GIS information and from on-line data available from the Virginia Department of Environmental Quality. Hazardous material sites included Superfund sites as characterized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); hazardous waste sites as defined by the Resource Conservation and Recovery Act of 1976 (RCRA); Toxics Release Inventory (TRI) sites; petroleum release sites; active solid waste landfills; and heavy industrial facilities. These sites pose potential risks to human health and the environment as a result of possible contamination to soil and/or groundwater.

4.11.1 I-81 Study Area

Hazardous waste sites were identified within a study area whose boundaries extend 500 feet on either side of the existing I-81 edge of pavement along the entire length of I-81 in Virginia. At interchanges, the study area extends outward to encompass potential interchange improvements (see Figure 5-1, Chapter 8, *Figures*). Figure 5-1 provides a composite view of land uses and depicts the locations of hazardous material sites identified within the I-81 study area. Based on available GIS data, no solid waste landfills or heavy industrial facilities were identified within the I-81 study area and therefore are not discussed below.

CERCLA Sites

Under CERCLA, EPA is charged with maintaining a National Priorities List (NPL), which identifies the nation's worst hazardous waste sites, and for informing the public about sites that warrant further investigation and pose the most significant risk to public health, welfare, and the environment. There are no active CERCLA sites within the I-81 study area. One site, Matthews Electroplating in Roanoke County, was previously an active site but was deleted from the NPL in 1989, after soil and groundwater monitoring revealed no further cleanup actions were needed.

RCRA Sites

RCRA established "cradle-to-grave" responsibility for sites that treat, store, and dispose of hazardous waste. There are seven such sites within the I-81 study area as listed on Table 4.11-1. The greatest concentration of sites are in Rockingham County. No RCRA sites are within the I-81 study area in Wythe, Pulaski, Montgomery, Roanoke, Botetourt, Rockbridge, Augusta, Shenandoah, and Warren Counties.

Table 4.11-1 RCRA Sites: I-81 Study Area

County	Facility Name
Washington	Cummins Cumberland, Inc.
Smyth	Grisson Motor Parts Co., Inc.
Rockingham	Truck-Thermo King, Inc.
	Truck and Equipment Corp.
	Harrisonburg Auto Auction
	Walker Manufacturing Co.
Frederick	Exxon Co. USA #26791

Source: VDOT, 2003

Toxic Release Inventory Sites

Under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), EPA developed an inventory of chemical releases from federal and industrial facilities. The Toxic Release Inventory (TRI) provides information to the public on the release and transfer of toxic chemicals from federal and industrial facilities in any given area. Table 4.11-2 lists the eight operations within the I-81 study area that transport chemicals to other facilities for further waste management. No facilities subject to TRI reporting are within the I-81 study area in Wythe, Pulaski, Montgomery, Roanoke, Botetourt, Rockbridge, Augusta, Rockingham, and Warren Counties.

Table 4.11-2 Toxic Release Inventory Sites: I-81 Study Area

County	Facility Name	Industry	Chemical(s) Transported
Washington	Strongwell Corporation	Plastics Products	Styrene
	Appalachian Plastics	Unknown	Unknown
Smyth	Marley Mouldings, Inc.	Furniture	Methanol, MEK, Toluene
	Utility Trailer Mfg. Co.	Truck Trailers	Unknown
	Merillat Corporation	Wood Cabinetry	N-Butyl Alcohol, Xylene
Shenandoah	Merrilat Corporation	Wood Cabinetry	Methanol, MEK, Xylene
Frederick	Stowe Woodward	Rubber Products	Lead compounds
	Bayer Corporation	Diagnostics	Formaldehyde, Methanol

Source: GIS data from U.S. Environmental Protection Agency, 2001

Petroleum Release Sites

Figure 5-1 depicts petroleum facilities registered with the DEQ within the I-81 study area. Based on review of information available on DEQ's web site, there are only two documented petroleum release sites within the I-81 study area that are considered "open" (*i.e.*, they have

not been administratively closed). Table 4.11-3 below details each of these sites, both of which are gas stations.

Table 4.11-3 Petroleum Release Sites: I-81 Study Area

County	Site Name and Address	Facility Type	Release Reported
Washington	Cherokee Food Store 23 1020 Old Airport Road Bristol, VA 24201	Gas Station	8/21/02
Roanoke	Texaco Stop In 110 351 Wildwood Road Salem, VA 24153	Gas Station	5/20/04

Note: The Virginia Department of Environmental Quality does not certify this data to be all inclusive or complete. These data are for informational purposes only.

4.11.2 Rail Study Area

For each of the rail sections included in the rail study area, hazardous waste sites were identified within a study area whose boundaries extend 500 feet on either side of the rail centerline. Based on available GIS data, no CERCLA sites, solid waste landfills, petroleum release sites, or heavy industrial facilities were identified within the 1,000-foot study area for each rail section. Therefore, the following discussion only describes the RCRA and Toxic Release Inventory sites identified for the rail sections. These hazardous materials sites are depicted in Figure 5-2 (see Chapter 8, *Figures*).

RCRA Sites

The only RCRA site is Marion Composites in Smyth County.

Toxic Release Inventory Sites

Only two toxic release inventory sites are within the 1,000-foot study area for each rail section– Marion Composites in Smyth County (also a RCRA site) and Safety-Kleen Systems, Inc. in Prince William County.